CROSS-BORDER INVESTMENT: INFORMATION ASYMMETRY, IMPERFECT CAPITAL MARKETS, AND HETEROGENEOUS FIRMS

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CROSS-BORDER INVESTMENT: INFORMATION ASYMMETRY, IMPERFECT CAPITAL MARKETS, AND HETEROGENEOUS FIRMS

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My dissertation investigates issues concerning information asymmetry, imperfect capital markets, and their impact on foreign portfolio investment (FPI) and cross-border mergers and acquisitions (M&As).

Chapter 1 studies how investors allocate their portfolio equity investment internationally. I develop a model to formalize the information signaling mechanism of foreign direct investment (FDI): When investors make FDI, due to their control and monitoring as insiders, they obtain the information about the returns on overseas subsidiaries and thereby extract the information about the returns on FPI. The extent to which FDI predicts the returns on FPI is referred to as the informativeness of FDI. I construct measures for the informativeness of FDI and find that FPI is more sensitive to FDI if FDI has a higher degree of informativeness.

Chapter 2, coauthored with G. Andrew Karolyi, investigates how imperfect capital markets and exchange rates affect firms' asset sales worldwide. We show that the informational imperfection on the capital markets impacts entrepreneurs' odds to win bids through two channels: First, it decreases the maximum amount of loans that entrepreneurs obtain; second, it reduces the cutoff level of entrepreneurs' initial wealth

below which they are credit rationed. We find that the cross-border asset sales between a country pair are negatively correlated with the financial development of the target country, while it is positively associated with that of the acquirer country. The depreciation of the target country currency is associated with a lower increase in the cross-border asset sales for a higher level of financial development of the target country.

Chapter 3 explores how firms' heterogeneous characteristics, in particular their competitiveness on the product market and productivity affect their domestic and cross-border corporate asset transactions. I find that firms participate in the domestic and overseas corporate asset markets through endogenous self-selection. Specifically, firms with high competitiveness are more likely to buy assets on the overseas markets, and they are more likely to sell assets on the domestic market. Firms with high productivity are more likely to buy assets on both the domestic and overseas markets, and they are less likely to sell assets on the domestic market.

BIOGRAPHICAL SKETCH

Xinli Wang graduated from Shandong University with a bachelor's degree in economics in 1999. She continued her study in Shandong University and obtained her master’s degree in economics in 2002. In August of 2006, she began her doctoral studies in economics at Cornell University.

To my parents

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CHAPTER 1

FOREIGN PORTFOLIO INVESTMENT AND INFORMATIVENESS OF FOREIGN DIRECT INVESTMENT

1.1 Introduction

Foreign portfolio equity investment (FPI) and foreign direct investment (FDI) have been increasing dramatically in the era of financial globalization. One key question on foreign portfolio investment is: How do investors allocate their portfolio investment across countries? Despite the diversification benefits from cross-border investment, investors still invest disproportionately more in domestic stocks than standard portfolio theory would suggest as optimal allocation, a phenomenon commonly called the home bias, which is one of the unresolved puzzles in the international finance literature. This phenomenon continues to exist in both industrial and developing countries (Chan, Covrig, and Ng, 2005; Bekaert and Wang, 2009).[1] One explanation offered for this puzzle is information asymmetry (Gehrig, 1993; Kang and Stulz, 1997; Ahearne, Griever, and Warnock, 2004; Portes and Rey, 2005; Mondria and Wu, 2011).[2]

The information-based international capital asset-pricing theoretical and empirical research literature shows that foreign purchases of the market portfolio tend to be positively correlated with the returns on the portfolio, which is known as the positive feedback trading by foreign investors (return-chasing behavior). This finding also suggests that investors may suffer from information asymmetry when they invest in foreign stocks (among others, see Brennan and Cao,

[1]Table 1.A.1 in the Appendix reports the home bias levels for 27 countries.
[2]Also see Lewis (1999) and Karolyi and Stulz (2003) for surveys of the home bias literature.

1997; Froot, O'Connel, and Seasholes, 2001; Karolyi, 2002; Griffin, Nardari, and Stulz, 2004; Brennan, Cao, Strong, and Xu, 2005; Albuquerque, Bauer, and Schneider, 2007; Dichev and Yu, 2011).

In contrast, researchers find that investors are acting like resident investors and are able to alleviate information asymmetry to some extent when they invest in FDI: They gain refined information about the returns of foreign subsidiaries (Goldstein and Razin, 2006) and resolve the demand uncertainty of their products in the foreign country (Moner-Colonques, Orts, and Sempere-Monerris, 2007), FDI can also reveal information about foreign fundamentals (De Santis and Ehling, 2007) and can serve as the original information endowment of investors (Andrade and Chhaochharia, 2010). These studies call for research on the role of information learning in the relationship between FPI and FDI: Can investors extract information from FDI about the returns of investing in a foreign country and facilitate their stock investment? My paper theoretically and empirically investigates this question.

I first propose a parsimonious model to demonstrate the channel by which FDI facilitates information extraction, and then I derive empirical predictions regarding the informativeness of FDI signals. Specifically, when investors make direct investment, due to their control and monitoring as insiders, they can obtain information about the returns of the overseas subsidiaries and thereby extract the information about the returns of making portfolio investment. I refer to the extent to which FDI predicts the returns of FPI in the target country as the informativeness of FDI. My model demonstrates that the informativeness of FDI reinforces the complementarity between FPI and FDI. In other words, when FDI provides more information that helps investors predict the returns of the target country, portfolio investment is more sensitive to direct investment, which constitutes the testable prediction of my paper.

I then empirically examine the effects of the informativeness of FDI on the sensitivity of FPI to FDI, which are characterized by the coefficients on the interaction terms between the measures of the informativeness of FDI and FDI. Unlike greenfield FDI, which is usually measured at the country level, cross-border mergers and acquisitions (M&As), which are an increasingly important component of FDI, are recorded at the deal level by Securities Data Corporation Platinum (SDC). This rich feature allows me to construct the informativeness measures at the country level. Guided by the theoretical model, I aggregate the characteristics of the individual cross-border M&A deals and construct four measures of informativeness for each country pair in each year.[3]

Using a large country-pair-year sample based on the Coordinated Portfolio Investment Survey (CPIS) of the International Monetary Fund (IMF), I construct the proportion of FPI holdings. I find that the correlation between FPI and FDI is positive and statistically significant, which provides the preliminary evidence of learning. More importantly, I find that the coefficients on the effects of informativeness of FDI on the sensitivity of FPI to FDI have the expected signs and are statistically significant and economically large, which provides supportive evidence for the channel highlighted in this paper: The informativeness of FDI reinforces the complementarity between FPI and FDI. Specifically, one measure of the informativeness is the degree of industrial concentration of the FDI in a particular target country, which measures the coverage of industries of cross-border deals given the total transaction values of cross-border M&As. Holding other variables fixed, if industrial concentration decreases by one standard deviation (0.28) from its sample average, a 1% increase in the proportion of FDI is associated with a 0.34% increase in the proportion of FPI.[4] As detailed in the main text of the paper, the effects of other measures of

[3]FDI includes greenfield FDI and cross-border M&As. To ease notation, I refer to cross-border M&As as FDI, with full awareness that cross-border M&As are only one important component of FDI.

[4]In other words, a one-standard-deviation increase in the proportion of FDI is associated with

informativeness on the sensitivity of FPI to FDI are also statistically significant and economically large, which provides empirical evidence for the model's predictions.
I then conduct several robustness tests. First, when I use alternative measures for the informativeness of FDI, the empirical findings still provide support for the model's predictions. Second, I perform additional tests by including control variables in the regressions, and the results provide further evidence that supports the theoretical framework. Third, the results from robust regressions, which are less sensitive to outliers than those from the OLS regressions, are consistent with the model's predictions, although the economic magnitude is weaker. Fourth, FPI is positively correlated with both the averages of FDI and the deviations of FDI from its sample average, and the coefficient estimates for the effects of informativeness of FDI on the sensitivity of FPI to FDI have the expected signs except for the coefficients on the interaction terms between the high-R&D deal ratio and the deviations of FDI.

I also find that the results are robust to different econometric specifications. Specifically, to further explore the effects of informativeness of FDI on the sensitivity of FPI to FDI, I estimate Panel Vector Autoregression (VAR) models in which no restrictions are imposed on the causal relationship between FPI and FDI. I apply two approaches in the estimation. In the first approach, I divide the data into two subsamples based on the median of each informativeness measure and then estimate two sets of bivariate Panel VARs separately. In the second approach, for each informativeness measure, I take the interaction term as an endogenous variable and estimate a trivariate Panel VAR. In both approaches, with regard to the informativeness measures considered, the orthogonalized impulse responses of FPI to the corresponding shocks provide supportive evidence for the model's predictions.

0.61 units of standard-deviation increases in the proportion of FPI.

Finally, I find that the model's predictions are also robust to an alternative data set, namely an annual data set compiled from Treasury International Capital System (TIC) of the U.S. Department of the Treasury. I construct correponding variables based on the data characteristics of TIC and conduct similar exercises to examine the effects of informativeness of FDI on the sensitivity of FPI to FDI. Regarding the proportion of FPI flows as the dependent variable, the results are reassuringly similar: In most of the regressions, the effects of informativeness of FDI on the sensitivity of FPI to FDI have the expected signs and are statistically significant, although I cannot find clear patterns using the Panel VARs.

This paper contributes to two lines of literature. The first is the information-based theoretical and empirical work on international investment. Regarding FPI, the observation on information asymmetry, theoretically and empirically, has been investigated in many studies and is still under debate (see, among others, Brennan and Cao, 1997; Ahearne, Griever, and Warnock, 2004; Brennan, Cao, Strong, and Xu, 2005). However, global information access and learning may eliminate this information asymmetry. Recently, Van Nieuwerburgh and Veldkamp (2009) show that when investors have a small information advantage in home assets, learning actually amplifies information asymmetry. Albuquerque, Bauer, and Schneider (2009) propose the concept of global private information[5] and show that investors can use the information on their own country when they are investing abroad, which can alleviate their information disadvantage in foreign markets.

Regarding FDI, existing research shows that FDI overcomes information asymmetry. Goldstein and Razin (2006) point out that when investing in FDI the control of investors enables them to

[5]This term is defined as the information which is relevant for trading in many foreign countries simultaneously; see page 19 in Albuquerque, Bauer, and Schneider (2009).

obtain refined information on the foreign subsidiary. Moner-Colonques, Orts, and Sempere-Monerris (2007) show that FDI resolves demand uncertainty of the products in the foreign country. De Santis and Ehling (2007) find that fitted growth rates of the stock of FDI help explain current growth rates of the stock of FPI, and they conclude that investors can learn the information about fundamentals in the target country via FDI. Andrade and Chhaochharia (2010) find that FDI ten years ago can serve as the original information endowment of investors when they invest in FPI.

Based on the research along this line, this paper shows that FDI facilitates information extraction. More importantly, using the theory as a guidance, I construct the measures of informativeness of FDI and provide robust empirical evidence that supports the model's predictions: The informativeness of FDI strengthens the positive correlation between FPI and FDI. Therefore, my paper theoretically and empirically pins down the impacts of bilateral exposure of real investment on financial investment, and thus identifies a novel role of FDI: information signaling in the allocation of FPI and thereby alleviating the information asymmetry about foreign markets. Because one of the explanations for the home bias is information asymmetry, this finding suggests that FDI can potentially help to reduce the degree of home bias and thereby reduce the cost of capital and improve the global risk sharing between domestic and foreign investors. This finding also complements the role of FDI as a mode to serve foreign markets versus exports when firms face the proximity-concentration trade-off (Horstmann and Markusen, 1992; Brainard, 1993; Markusen and Venables, 2000; Helpman, Melitz, and Yeaple, 2004; Ramondo, Rappoport, and Ruhl, 2010; Fajgelbaum, Grossman, and Helpman, 2011; Oldenski, 2012).

Second, my paper adds to the studies on the informativeness of signals. A growing literature investigates the price informativeness and (non)synchronicity in stock returns (see, among others, Grossman and Stiglitz, 1980; Roll, 1988; Morck, Yeung, and Yu, 2000; Li, Morck, Yang, and

Yeung, 2004; Veldkamp, 2006; Chen, Goldstein, and Jiang, 2007; Goldstein, Ozdenoren, Yuan, 2011; Edmans, Goldstein, and Jiang, 2012). The existing research on these issues examines the degree to which the signal reveals the fundamental value of a particular firm. Built upon the previous work, my paper measures the informativeness of signals in an international context. Specifically, in my paper, the informativeness is referred to as the degree to which FDI reveals the market portfolio returns in a particular target country. Using the deal-level data on FDI, I construct measures of the informativeness according to investors' behaviors when they make FDI. My paper further links the degree of informativeness of FDI to the sensitivity of FPI to FDI. Thus, based on the comprehensive data on FPI and FDI, my paper extends the idea of informativeness of signals to an open-economy context.

The remainder of this paper is organized as follows. Section 1.2 develops a theoretical model to formalize how FDI facilitates information extraction and derives the testable hypothesis. The empirical analysis follows in Section 1.3, in which I describe the sample of FPI and FDI, data sources, variable construction, and the econometric model. The main results are provided in Section 1.4. Robustness tests are explored in Section 1.5, and Section 1.6 concludes the paper.

1.2 Model and Testable Hypothesis

1.2.1 Model

There are N countries in the world. Consider an arbitrary country pair i and j in the global economy, where i stands for the source country and j is the target country. The derivations apply to any country pair i and j in the following discussions. There is a representative investor in the source country, who has a chance to invest in a foreign country (host country). She can choose to invest via FDI and/or FPI. Following the standard literature, the investor invests in the country index when making FPI. In the case of FDI, since the investor has direct control over the foreign affiliate, she can observe a signal about the returns of investing in the

target country.

There are two dates: 0 and 1. At date 0, the investor decides whether to make FDI to obtain the signal about the returns. At date 1, the investor decides the optimal amount of investment: If she chooses to do FDI, then she invests in both FDI and FDI-based FPI; otherwise, she invests in portfolios only. At the end of date 1, the investor consumes. Investing in FDI incurs fixed costs of F_{ij}, which include the distribution and servicing network costs, as well as the costs of building or purchasing a subsidiary in a foreign country and the overhead production costs. F_{ij} has a cumulative distribution function in a general form $G(F)$ over the interval $\left[\underline{F}, \overline{F}\right]$. Specifically, the investor first draws a payment of the fixed costs F_{ij} from the distribution $G(F)$. Upon observing this draw, the investor may decide not to make FDI. If she chooses to invest in FDI, she obtains a signal about the returns of investing in the target country, which she can use to predict the returns of making FPI. The global net risk-free rate is normalized to be 0. Let θ_j be the index returns of the target country in excess of the risk-free rate. θ_j is normally distributed with mean $\overline{\theta}_j$ and variance $1/\rho_\theta$ and is independent across countries.

Following Brennan and Cao (1997) and Brennan, Cao, Strong, and Xu (2005), I assume that the investor is characterized by a constant absolute risk aversion (CARA) utility function: $-e^{-W}$, where W denotes the wealth.[6]

The total payoff per unit of FPI in country j is $(1+\theta_j)$, that is, if the investor invests $k_{P,ij}$, then at the end of date 1 her total wealth W_i^1 is

[6]To simplify the derivation, I assume that the coefficient of constant absolute risk aversion is equal to 1. The results hold for any positive coefficient of constant absolute risk aversion.

$$W_i^1 = \left(W_i^0 - \sum_{j=1}^{N} k_{P,ij} \right) + \sum_{j=1}^{N} \left(1+\theta_j\right) k_{P,ij} = W_i^0 + \sum_{j=1}^{N} \theta_j k_{P,ij}.$$

Without loss of generality, suppose the initial wealth at date 0, W_i^0, is 0. Therefore, the budget constraint at date 1 degenerates into

$$W_i^1 = \sum_{j=1}^{N} \theta_j k_{P,ij}.$$

At date 1, if the investor chooses to make FPI only, her decision is

$$\max_{\{k_{P,ij}\}_{j\in\{1,2,\ldots N\}}} E\left[-e^{-W_i^1}\right]$$

subject to

$$W_i^1 = \sum_{j=1}^{N} \theta_j k_{P,ij}.$$

The optimal amount of FPI in target country j is

$$k_{P,ij}^* = \rho_\theta \bar{\theta}_j.$$

The date-0 indirect utility of doing FPI is $U_{P,i} = -e^{-0.5\rho_\theta \sum_{j=1}^{N} \bar{\theta}_j^2}$, and the certainty equivalent is $CE_{P,i} = 0.5\rho_\theta \sum_{j=1}^{N} \bar{\theta}_j^2$.

If the investor chooses to make FDI, she first pays the fixed costs F_{ij}. After paying F_{ij}, she obtains a signal on the returns of investing in target country j and receives a cash flow $V_{D,ij}$ at date 1. The return per unit of direct investment is affected by both the target country index returns θ_j and an idiosyncratic shock ε_{ij}.

Following Goldstein and Razin (2006), I assume that the cash flow from FDI is in a quadratic form

$$V_{D,ij} = \left(\theta_j + \varepsilon_{ij}\right) k_{D,ij} - 0.5 k_{D,ij}^2 - F_{ij},$$

where $k_{D,ij}$ stands for the amount of FDI. ε_{ij} is normally distributed with mean 0 and variance $1/\rho_\varepsilon$, and ε_{ij} is independent of θ_j. At date 1, after observing $\theta_j + \varepsilon_{ij}$, the investor maximizes

the cash flow received in country j as follows:

$$\max_{k_{D,ij}} \left[\left(\theta_j + \varepsilon_{ij} \right) k_{D,ij} - 0.5 k_{D,ij}^2 - F_{ij} \right].$$

The optimal amount of FDI is

$$k_{D,ij}^* = \theta_j + \varepsilon_{ij}. \tag{1.1}$$

Therefore, the optimal cash flow from FDI is

$$V_{D,ij}^* = \frac{\left(\theta_j + \varepsilon_{ij} \right)^2}{2} - F_{ij}. \tag{1.2}$$

Since the representative investor observes the signal $\theta_j + \varepsilon_{ij}$ in country j, conditional on this signal she is able to extract and learn the information about the index returns θ_j, which facilitates her decision on the amount of FPI to do in country j. Therefore, the investor makes additional investment in FPI, which I refer to as FDI-based FPI. So, at date 1, conditional on the observed signal $\theta_j + \varepsilon_{ij}$, the investor chooses the amount of FDI-based FPI to maximize the expected utility

$$\max_{\left\{ k_{P|D,ij} \right\}_{j \in \{1,2,\ldots N\}}} E\left[-e^{-W_i^1} \mid \left\{ \theta_j + \varepsilon_{ij} \right\}_{j \in \{1,2,\ldots N\}} \right]$$

subject to

$$W_i^1 = \sum_{j=1}^{N} \left(V_{D,ij}^* + \theta_j k_{P|D,ij} \right),$$

where $k_{P|D,ij}$ is the amount of FDI-based FPI in country j.

As θ_j's are independent, given the CARA-normal structure, the optimal amount of FDI-based FPI is

$$k_{P|D,ij}^* = \rho_\theta \bar{\theta}_j + \rho_\varepsilon \left(\theta_j + \varepsilon_{ij} \right). \tag{1.3}$$

Note that $V_{D,ij}^*$ does not affect $k_{P|D,ij}^*$ because $V_{D,ij}^*$, as shown in (1.2), is a constant given the information set $\left\{ \theta_j + \varepsilon_{ij} \right\}_{j \in \{1,2,\ldots N\}}$, and the CARA assumption implies that the portfolio invesment is wealth independent.

Given (1.1) and (1.3), the relationship between the optimal amount of FDI-based FPI and FDI is

captured by

$$k^*_{P|D,ij} = \rho_\theta \bar{\theta}_j + \rho_\varepsilon k^*_{D,ij}. \quad (1.4)$$

Applying the moment-generating function of non-central Chi-square distributions, I can compute the date-0 indirect utility $U_{D,i}$ of doing FDI and the corresponding certainty equivalent $CE_{D,i}$, which negatively linearly depends on the fixed costs F_{ij}. Therefore, in equilibrium, there exists a threshold value F^*_{ij} such that the investor from country i is indifferent between choosing to do FDI to obtain the signal on the returns of investing in target country j and choosing to invest only in FPI in country j.

To summarize, if the representative investor from country i draws a payment of fixed costs F_{ij} below F^*_{ij}, she makes FDI and FDI-based FPI; otherwise, she only invests in FPI.[7] Therefore, at the country level, the relationship between FPI and FDI is captured by Eq. (1.4).

1.2.2 Testable Hypothesis

Eq. (1.4) is the basis of the empirical analysis. Its empirical implications are twofold. First, Eq. (1.4) implies that the optimal amount of FPI is positively correlated with the optimal amount of FDI. More importantly, as the sensitivity of FPI to FDI is captured by ρ_ε, Eq. (1.4) has an implication for the informativeness of the signal. Given that $1/\rho_\varepsilon$ is the variance of the noise in the signal, a high value of $1/\rho_\varepsilon$ means that the signal is very noisy and that investors cannot easily predict the market returns θ_j based on the signal. Thus, ρ_ε captures the informativeness of FDI, which is defined as the extent to which FDI predicts the returns of making portfolio investment in the foreign target country. A higher value of ρ_ε implies a higher degree of

[7] If the investor only makes FPI, then the optimal amount of FDI, $k^*_{D,ij} = 0$. Therefore, there is no relationship between FPI and FDI.

informativeness.

The model's implications are also intuitive. At a given point in time, if investors try to predict the returns in each target country, and thus decide the amount of portfolio investment in each target country, they will use all information available to them at that point. This includes both the information that investors have themselves and the information that they learn from the direct investment. In this scenario, portfolio investment will be more sensitive to direct investment when direct investment provides more information that helps investors predict the returns of the target country, i.e., when direct investment is more informative. Accordingly, I present the following testable hypothesis:

Hypothesis 1.1 *If direct investment has a higher degree of informativeness, i.e., a higher value of* ρ_{ε}*, portfolio investment is more sensitive to direct investment.*

1.3 Empirical Analysis

1.3.1 Data and Sample

To empirically test the above hypothesis, I obtain a comprehensive data set on FPI and FDI. I obtain the FPI data from two sources: the CPIS of the IMF[8] and the TIC of the U.S. Department of the Treasury.[9] CPIS records the most comprehensive year-end holdings of bilateral foreign portfolio equity securities valued at market prices, and the sample covers the period from 2001 to 2008. TIC reports the international investment flows of equity securities by U.S. residents, and the sample is over the period from 1985 to 2010.[10]

[8]Lane and Milesi-Ferretti (2008) analyze the data collecting of the CPIS database and conclude that (page 541) "[T]hese shortfalls notwithstanding, the CPIS provides a unique perspective on cross-country equity positions that warrants a detailed analysis."

[9]One weakness of the TIC data is that the data are recorded by geographic region and not by the security's country of origin. Therefore, the data could be unrepresentative of countries in which international financial centers are located (Warnock and Cleaver, 2002).

[10]Although the TIC data start from January 1977, the coverage of the cross-border M&As reported by SDC only starts from January 1, 1985.

Regarding the country sample, based on the data availability of the CPIS and Datastream, for each variable applied, I construct a bilateral data matrix of 42 acquirer countries and 42 target countries. For the CPIS sample, over the period from 2001 to 2008, these 42 countries, on average, account for 95.79% of the total amount of foreign portfolio holdings worldwide. Over the period of 1985 to 2010, the 41 countries, on average, account for 85.81% of the total amount of gross purchases of foreign equities by U.S. residents. The countries are listed in Table 1.A.6.

I use the country-level characteristics of cross-border M&As to measure the information obtained from FDI. To construct informativeness measures at the country level, I aggregate the relevant information of individual cross-border M&A deals that are reported by SDC. Regarding the CPIS data, I construct the cross-border M&A sample using the following criteria: (1) both the target and acquirer countries are in the country list as shown in Table 1.A.6; (2) the deal is announced between January 1, 2001 and December 31, 2008, and is completed by the end of the sample period; (3) the deal is cross-border; (4) to reduce measurement errors, the deal value must be at least 1 million U.S. dollars; (5) following the standard literature, I exclude leveraged buyouts, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, and privatizations from the sample; and (6) I exclude deals in which the target or the acquirer is a government agency.[11] The maximum number of cross-border deals is 46,873.

In order to match with the FPI data from TIC, I use the following criteria to screen the cross-border M&A deals: (1) the acquirer country is the U.S., and the target country is in the country list as shown in Table 1.A.6 except the U.S.; (2) the deal is announced between January 1, 1985 and December 31, 2010 and is completed by the end of the sample period; and the above

[11]Karolyi and Liao (2010) investigate the cross-border acquisitions led by government-controlled acquirers from 1990 to 2008 using the corporate-led acquisitions as a benchmark.

criteria (3) to (6) are also applied to this screening process. The maximum number of cross-border deals corresponding to the TIC sample is 9,196 .[12]

Based on the model's predictions, I test whether investors hold more portfolio investment in a foreign market if they find that cross-border M&As are more informative in predicting the returns of that foreign market. Accordingly, for the CPIS data, the dependent variable is measured by the proportion of FPI holdings of each source country i in the total FPI liabilities of target country j in year t. Correspondingly, I use the proportion of transaction values of cross-border M&A deals as the measure for FDI, which is defined as the percentage of the transaction values of cross-border deals from each acquirer country i (source country) to target country j in the total values of cross-border deals in target country j in year t.[13] For the same reason, when examining firm characteristics, such as their R&D expenditures, I focus on those of the target firms.

For the TIC data, since the U.S. is the only source country, the dependent variable is measured by the proportion of FPI flows by U.S. residents into a specific target country in the total FPI flows out of the U.S. in year t. Specifically, the proportion of FPI is the gross purchases of country j's equities by U.S. residents scaled by the total gross purchases of equities in the 41

[12]The number of deals used in the computation of each informativeness measure may vary depending on the availability of the specific data items.

[13]As FPI is measured by values instead of counts, I use transaction values to measure the proportion of cross-border M&As. Moreover, it is appropriate to use the transaction values to construct the informativeness measures, such as industrial concentration, value concentration, industrial relatedness, and weighted beta. Therefore, I report the regression results using the proportion of transaction values of cross-border M&As. As additional tests, I use the proportion of counts of cross-border M&As and its interaction terms with informativeness measures as regressors and conduct the exercises. The results also provide support to the model's predictions and are available upon request.

countries by U.S. residents in year t. Correspondingly, the proportion of FDI is the transaction values of cross-border deals involving the U.S. as the acquirer and country j as the target scaled by the total transaction values of cross-border M&As from the U.S. to the 41 countries. The definitions of all variables and data sources are described in Table 1.A.2.

1.3.2 Variable Construction

In this subsection, I first present how the informativeness measures are constructed; I then outline various control variables, as documented in the existing literature.

1.3.2.1 Informativeness Measures

The most novel feature of my model is that the degree of informativeness of FDI reinforces the sensitivity of FPI to FDI. To test this hypothesis, I require data that quantify the degree of informativeness of FDI for each country pair in each year. I rely on guidance from the model to construct measures of informativeness of FDI. According to my model, a low variance (low $1/\rho_{\varepsilon}$) of the idiosyncratic returns implies that the variation from the idiosyncratic returns is low at the aggregate level. Therefore, given the total variation of the total returns, the variation from the index (systematic) returns is high, which helps investors to predict the index (systematic) returns and thereby stands for a high degree of informativeness of FDI. Based on the economic meaning of parameter ρ_{ε}, I construct two sets of informativeness measures. As detailed below, the first set, which includes the *industrial concentration* and the *deal value concentration,* measures the informativeness from the perspective of the dispersion of deals. The second set, which includes the *high-R&D deal ratio* and the *high-tech deal ratio,* measures the informativeness from the perspective of the implied idiosyncratic returns of the target firms by their production characteristics.

First, I construct the measure *industrial concentration*. Given the total values of cross-border

M&A deals in a target country, if these deals cover numerous industries, they stand for a low degree of industrial concentration, which implies that at the aggregate level the idiosyncratic part of each individual FDI firm cancels out and that the variation from the idiosyncratic returns is low. Therefore, given the total variation of the total returns, the variation from the index (systematic) returns is high, which helps investors to predict the index (systematic) returns. Thus, the model predicts that when M&As are more industrially concentrated, an additional percentage increase in FDI is associated with a lower increase in FPI. I use the Herfindahl-Hirschman index to measure the degree of industrial concentration,[14] and I include the industrial concentration and its interaction with the proportion of FDI in the regression. Given that a high Herfindahl-Hirschman index stands for a high degree of industrial concentration, I expect a higher interaction term to be associated with a lower proportion of FPI.

As an alternative measure to the *industrial concentration*, I construct the *deal value concentration*. Given the total values of all cross-border deals in a target country, if there are a large number of deals with relatively small values, then these deals represent a low degree of value concentration. Deals with a low degree of value concentration can represent the target country economy to a greater extent, which implies that the variation from the idiosyncratic returns is lower. Therefore, the model predicts that when FDI is less value concentrated, an additional percentage increase in FDI is correlated with a higher increase in FPI. I include the deal value concentration and its interaction with the proportion of FDI in the regression, and I expect a negative coefficient estimate on the interaction term.

Another measure is the *high-R&D deal ratio*. Firms with high R&D expenditures have earnings that depend on the realization of future investment opportunities (Lorek, Stone, and Willinger,

[14]Roll (1992) and Morck, Yeung, and Yu (2000) use similar measures in cross-country studies.

1999). Therefore, the variance of idiosyncratic returns of these firms is high. However, if there are many deals involving foreign target firms with high R&D expenditures, this implies that in this specific target country, the volatility of idiosyncratic returns of these firms is revealed to be low ex post (low $1/\rho_{\varepsilon}$), which suggests that the signal on the returns is less noisy and that investors can better predict the systematic returns. Therefore, the informativeness of FDI is high.

The high-R&D deal ratio is constructed in the following way. For a specific country pair i (acquirer country) and j (target country) in year t, deals involving a target firm in a high R&D industry are defined as high-R&D deals. The high-R&D deal ratio is then defined as the fraction of high-R&D deals in the total number of cross-border deals in country j. The ratio is computed through the following steps. For each target firm with data on R&D expenditures one year prior to the announcement of the M&A deals, I scale its R&D expenditures by its total assets and define this ratio as $rd_{n,d,ij,t}$, where n, d, i, j, and t are the target firm index, its 4-digit Standard Industrial Classification (SIC) index, the acquirer country index, the target country index, and the year of the announcement of the deal, respectively. I then take the average of $rd_{n,d,ij,t}$'s over all the target firms in the same 4-digit SIC industries and define the average, $\overline{rd_d}$, as the R&D expenditure ratio of industry d. I rank all the 4-digit SIC industries according to $\overline{rd_d}$. If $\overline{rd_d}$ is above the median, then industry d is defined as a high-R&D industry. If the target firm operates in a high-R&D industry, the dummy variable, defined for target firm n, $high\_rd_{n,d,ij,t}$, equals 1; otherwise, 0. Finally, I compute the high-R&D deal ratio, $high\_rd_{ijt}$, for each target-acquirer country pair in each year, $high\_rd_{ijt} = \frac{\sum_{n=1}^{N_{ijt}} high\_rd_{n,d,ij,t}}{N_{ijt}}$, where N_{ijt} is the total number of deals involving acquirer country i and target country j in year t. I include this ratio and its interaction with the proportion of FDI in the regression, and I expect a positive coefficient estimate on the interaction term.

Using the same logic, as an alternative to the high-R&D deal ratio, I construct the *high-tech deal*

ratio. A deal is defined as a high-tech deal if both the acquirer and the target firms are high-tech companies; otherwise, it is a non-high-tech deal. For a specific country pair i (acquirer country) and j (target country) in year t, the high-tech deal ratio is defined as the fraction of the high-tech deals involving acquirer firms from country i in the total number of cross-border deals in country j in year t. The higher the high-tech deal ratio for a specific country pair, the less the variation there is from the noise in the return signals, and the more informative FDI is. I include the high-tech deal ratio and its interaction with the proportion of FDI in the regression, and I expect a positive coefficient estimate on the interaction term.

1.3.2.2 Additional Control Variables

In addition to the informativeness measures, I also control for various variables that may be correlated with FPI and FDI, as documented in the existing literature.

First, I control for the differences in stock returns between the target country and the acquirer country. Many studies show that foreign investors are return-chasing (Brennan and Cao, 1997; Froot, O'Connel, and Seasholes, 2001; Karolyi, 2002; Griffin, Nardari, and Stulz, 2004; Albuquerque, Bauer, and Schneider, 2007). A higher difference may attract the acquirer country investors to invest more in the target country; therefore, I expect a positive association between FPI and the differences in stock returns. I compute the differences on an annual basis.

Second, I control for the stock return correlation, measured by the pairwise correlation between the monthly Morgan Stanley Capital International (MSCI) market returns of target country j and acquirer country i over the past five years before year t. Investors may use foreign assets to hedge against home-country-specific risks, for example, real exchange rate risk and risk from non-tradable wealth components such as non-financial income (Adler and Dumas, 1983; Cooper and Kaplanis, 1994; Coeurdacier and Gourinchas, 2009). This hedging motive may lead to an

increase in FPI. A high stock return correlation reduces the diversification potential between the two markets, and therefore I expect the coefficient on the stock return correlation to be negative.

Third, I also include relative stock return volatility of the target country in the regressions, which is measured by the differences between the annualized stand deviation of the target country stock returns and that of the world market stock returns over the past five years before year t. Van Nieuwerburgh and Veldkamp (2009) predict that portfolio investors intend to learn the information about the stocks with high uncertainty. This implies that the correlation between portfolio investment and stock return uncertainty of a target country should be positive.
Fourth, the regressions also control for the changes in real exchange rates between the target country and the acquirer country. Since the real exchange rate is defined as the value of the acquirer country currency in terms of the target country currency, a positive change means the depreciation of the target country currency. Existing research finds mixed results regarding the correlation between the foreign investment into a target country and the changes in the exchange rates of this target country.[15]

I also include the degree of capital account openness in the regressions. Capital controls have been shown to affect portfolio investment (Black, 1974; Stulz, 1981). Recent empirical findings suggest that restrictions on cross-border capital flows still exist in emerging markets and other developing economies (Kose, Prasad, Rogoff, and Wei, 2009) and that equity market segmentation remains significant in emerging markets (Carrieri, Errunza, and Hogan, 2007;

[15]Griffin, Nardari, and Stulz (2004) find that a depreciation of the local currency leads to more foreign equity inflows in two of nine countries examined. Karolyi (2002) finds that during the Asian crisis the response of foreigners' net purchases of Japanese equity to a depreciation of the yen is negative and then quickly dissipates to zero. Under the assumption of incomplete risk sharing of foreign exchange risk, Hau and Rey (2006) show that a foreign currency appreciation is positively correlated with net equity flows into the foreign market.

Bekaert, Harvey, Lundblad, and Siegel, 2011). I include the Chinn-Ito index of capital account openness of both the target and the source countries in the regressions.

I further control for the institutional quality by including in regressions the country governance, which stands for the information and legal environment. If this environment is transparent, investors are able to easily obtain information, and the information asymmetry can be alleviated. Country governance is computed as the average of the ten economic freedom scores tracked by *The Wall Street Journal* and The Heritage Foundation.

In addition, I control for the liquidity and transaction costs of a stock market. As suggested by Chan, Covrig, and Ng (2005), investors tend to invest in more developed stock markets which have higher liquidity and lower transaction costs. Following these authors, I control for the market capitalization of listed companies to GDP ratio and turnover ratio of both the source and target countries in the regressions.

Finally, language barriers and geographic distances can also be important sources of informational cost to cross-border investment, and therefore they become barriers to foreign investment (Grinblatt and Keloharju, 1999; Hau, 2001). Thus, I also include an indicator variable for common language for the target-acquirer country pair and the geographic distance between the target country and the acquirer country.

1.3.3 Econometric Methodology

The summary statistics are reported in Table 1.A.3. The data show that there are large variations in the variables of interest. Although the average number of time series observations is limited for some variables, the number of cross-sectional units is large. Tables 1.A.4 and 1.A.5 report the pairwise correlations of the variables for the CPIS data and the TIC data, respectively. As

pointed out above, I construct two sets of informativeness measures: The industrial concentration and the value concentration belong to the first set, and the high-R&D deal ratio and the high-tech deal ratio belong to the second. As shown in Table 1.A.4, the industrial concentration and the value concentration are highly correlated, with a correlation of 0.95, and the high-R&D deal ratio and the high-tech deal ratio are also correlated, with a correlation of 0.47. However, the correlations of measures in different sets are very low. The correlations of the informativeness measures for the TIC data display similar patterns, which are detailed in Table 1.A.5. These observations are consistent with the economic perspective from which these measures are constructed, and these two sets of measures are based on the economic meaning of parameter ρ_{ε} in the theoretical model. Therefore, I include the combination of the industrial concentration and the high-R&D deal ratio in my main empirical tests. I also conduct further tests using the other three combinations.

The objective of this paper is to investigate the role of information on actual portfolio allocations instead of on deviations of portfolio allocations from their sample averages. In the panel data setting, the errors may be correlated over time periods for a given country pair (the cross-sectional unit), and/or they may be correlated across country pairs for a given year. As the baseline econometric methodology, I apply the pooled Ordinary Least Squares (OLS) regression in the empirical analysis, which matches the model-implied theoretical relationship between FPI and FDI. I include year dummies in the regression and use the clustered standard errors by target-acquirer country pairs to deal with correlations between country pairs in the same year. The time dummies are designed to remove the correlation between country pairs in the same year, and clustering by country pairs is designed to obtain the unbiased estimation of standard errors. This methodology is proposed by Petersen (2009) and is used in the existing literature (Bekaert and Wang, 2009; Ferreira, Massa, and Matos, 2009; among others).[16] The proportions of FDI

[16]As pointed out by Petersen (2009), clustering by two dimensions produces less biased standard

and informativeness measures are lagged by one panel year to mitigate the effect of endogeneity. I use the pooled OLS as the baseline econometric methodology, and various robustness tests are conducted in Section 1.5.

Based on Eq. (1.4), I estimate the following model in the panel data setting:

$$FPI_{ijt} = \alpha + \gamma FDI_{ij,t-1} + \kappa X_{ij,t-1} + \delta FDI_{ij,t-1} \cdot X_{ij,t-1} + \phi Z_{ijt} + f_t + u_{ijt}, \quad (1.5)$$

where $X_{ij,t-1}$ is a vector representing the measures for informativeness of FDI, Z_{ijt} is a vector of additional control variables, f_t stands for the year dummies, and u_{ijt} is the idiosyncratic term. Leaving the level terms $X_{ij,t-1}$ out can result in the interaction terms being spuriously significant; therefore, I also include the level terms in the regression.

I focus on the estimation of coefficient δ, that is, FDI may have a different effect on FPI for country pairs that have different informativeness measures $X_{ij,t-1}$. Holding all other variables fixed, the partial effect of FDI on FPI is

$$\frac{\partial FPI_{ijt}}{\partial FDI_{ij,t-1}} = \gamma + \delta X_{ij,t-1},$$

which varies with the values of the informativeness measures. I evaluate the partial effect at the sample mean of the informativeness measure. Take the informativeness measure industrial concentration as an example. If the coefficient estimate on the interaction term between FDI and the industrial concentration is less than 0, it implies that an additional percentage increase in FDI in the previous year is associated with a lower increase in FPI for a higher degree of industrial

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errors. However, clustering by cross-sectional units and time does not always yield unbiased estimates. As the number of clusters---cross-sectional units or years---declines, the standard errors clustered by cross-sectional units and time are biased, although the magnitude of the bias is not large. When there are only a few clusters in one dimension, clustering by the more frequent cluster yields results that are almost identical to clustering by both cross-sectional units and time. In this specific setting, I have around 1,000 country pairs and at most 7 years (varying depending on the explanatory variables); therefore, I cluster by country pairs.

concentration, i.e., the effect of FDI on FPI is weaker if FDI is less informative in predicting the index returns of investing in the target country.

1.4 Results

In this section, I present the results using the CPIS data. The results based on the TIC data are reported in Section 1.5 as a robustness test.

1.4.1 Baseline Regressions

Table 1.1 reports results of the multivariate regression analysis (1.5) without additional control variables. The dependent variable is the proportion of FPI, i.e., the percentage of FPI holdings from source country i in the total FPI liabilities of target country j. In order to raise the level of confidence in the results, I consider several variants of the basic specification. Columns (1) to (4) present the results from regressions with each of the four informativeness measures and its corresponding interaction term with FDI as explanatory variables. As the two sets of measures capture different aspects of the informativeness of FDI, and the measures within each set are highly correlated, columns (5) to (8) display the results from regressions with a combination of two informativeness measures from two different sets. All of the coefficients on the interaction term are statistically significant and have the expected signs.

To assess the magnitude of these effects, I set the values of all the informativeness measures in the regression to their sample average values and compute the percentage changes in FPI implied by a 1% change in FDI. Regarding the informativeness measure industrial concentration, I choose column (5) to illustrate the magnitude of its effects, as column (5) is used as a baseline regression in the following analysis. The coefficient on the interaction term of industrial concentration with FDI is negative and statistically significant. Holding all other variables fixed, a 1% increase in FDI is associated with a 0.15% increase in the proportion of FPI. If industrial

concentration decreases by one standard deviation (0.28) from its sample average, a 1% increase in the FDI proportion is associated with a 0.34% increase in the proportion of FPI. Therefore, when measured by industrial concentration, the effects of informativeness of FDI on the sensitivity of FPI to FDI is economically large. As shown in columns (1) and (6), the effects of industrial concentration have a similar magnitude. As an alternative to industrial concentration, I include value concentration as a measure for informativeness in the regression; as shown in columns (2), (7), and (8), the effects of value concentration are also statistically significant and economically large.

Regarding the economic significance of the high-R&D deal ratio, as shown in column (5), evaluated at the sample average of the high-R&D deal ratio, if the FDI proportion increases by 1%, then the proportion of FPI increases by 0.76%. If the high-R&D deal ratio increases by one standard deviation (0.36) from its sample average, a 1% increase in the FDI proportion is associated with a 0.85% increase in FPI. As an alternative to the high-R&D deal ratio, I include the high-tech deal ratio in the regressions; as reported in columns (4), (6), and (8), the results regarding the high-tech deal ratio are also statistically significant and economically large.

I also calculate standardized coefficients, i.e., beta coefficients for the above independent variables. They are reported in Table 1.2, along with the sample means and standard deviations of the relevant variables. A beta coefficient converts the regression coefficients into units of sample standard deviations. It calculates the units of standard-deviation change in FPI implied by one unit of standard-deviation change in FDI. Evaluated at the sample average of the industrial concentration, a one standard-deviation increases in the FDI proportion is only associated with a 0.27 standard-deviation increase in the proportion of FPI. If the industrial concentration decreases by one standard deviation from its sample average, a one standard-deviation increase in the FDI proportion is associated with a 0.61 standard-deviation increase in the proportion of

FPI. These beta coefficients suggest that the informativeness measures have an impact comparable to that implied by the differences in stock returns between the target and the source countries, one of the standard variables in the international portfolio investment literature. Taken as a whole, these results provide strong support for the model's predictions.

1.4.2 Regressions with Additional Control Variables

In this section, I explore the sensitivity of the results to alternative assumptions that incorporate other determinants of FPI which are not captured by Eq. (1.4). Table 1.3 presents the tests including additional explanatory variables that are correlated with FPI, as documented in the existing literature. I report the results including the industrial concentration and the high-R&D deal ratio as informativeness measures. Because the results with other combinations of informativeness measures are similar, in order to save space I do not include them in Table 1.3.[17]

Compared with regression (5) in Table 1.1, in regression (1) in Table 1.3 I include two additional regressors, namely the differences in stock market returns and the pairwise stock return correlation between the target country and the source country. The coefficients on the interaction terms of the informativeness measures remain statistically significant and have the expected signs, and the economic magnitudes are similar to those in Table 1.1. The coefficient on the differences in stock returns is positive and statistically significant. This result is consistent with the positive feedback trading by international investors, which is documented in the existing literature (among others, see Brennan and Cao, 1997; Froot, O'Connel, and Seasholes, 2001; Griffin, Nardari, and Stulz, 2004; Albuquerque, Bauer, and Schneider, 2009). The magnitude of this correlation is also large: a one-standard-deviation increase in the stock return differences is associated with a 2.12% increase in the proportion of FPI, which corresponds to 25.07% of its

[17]The results are available upon request.

standard deviation across all country-pair-years. The coefficient on the pairwise stock return correlation is statistically insignificant.

Columns (2) to (9) display eight different specifications that extend the regression in column (1) with each of the eight sets of additional variables: the relative stock return volatility, changes in real exchange rates, capital account openness, country governance, market capitalization to GDP ratio, the turnover ratio, the common language dummy, and geographic distance. In all eight specifications, the coefficients on the interaction terms of the informativeness measures are statistically significant and of a similar magnitude to those in column (1). Among the control variables, as shown in columns (2) to (9), the coefficients on the differences in stock returns are positive and statistically significant, as before, and the coefficients on the pairwise stock return correlation are statistically insignificant.

Of the eight sets of new variables introduced in these additional analyses, the coefficients on the relative stock return volatility; changes in real exchange rates; the source country's characteristics, including capital account openness, country governance, market capitalization to GDP ratio, and the turnover ratio; the common language dummy; and geographic distance are positive and statistically significant. The positive correlation between FPI and the relative stock return volatility is consistent with the model's prediction in Van Nieuwerburgh and Veldkamp (2009) and with the findings in Andrade and Chhaochharia (2010). The positive correlation between FPI and changes in real exchange rates is consistent with the findings in Griffin, Nardari, and Stulz (2004).

The coefficient on the target country's turnover ratio is negative and statistically significant; coefficients on the other characteristics of the target country, including capital account openness, market capitalization to GDP ratio, and country governance, are statistically insignificant.

Regarding the magnitude of the coefficient on the target country's turnover ratio, a one-standard-deviation increase in turnover ratio is associated with a 1.34% decrease in the proportion of FPI, which corresponds to 15.80% of its standard deviation across all country-pair-years. Intuitively, foreign investors would have a tendency to invest more in countries with higher stock market turnover; however, in a market with short-sales constraints, turnover of the stocks, or more generally liquidity, can serve as a sentiment index; thus, high turnover is related to overvaluation (Baker and Stein, 2004; Baker and Wurgler, 2006, 2007). As shown in columns (7) and (11), a negative association between FPI and the turnover ratio accords with their finding.

In column (10), I include all of the regressors, and the results are reassuringly similar. The coefficient on capital account openness of the target country is positive and statistically significant, which is consistent with the results in Bekaert and Wang (2009) and in Andrade and Chhaochharia (2010). The coefficient on the target country's turnover ratio is statistically insignificant.

It is possible that an omitted variable affecting both FDI and FPI creates an endogeneity problem in the OLS specifications. To address this endogeneity issue, column (11) reports the result from the instrumental variable (IV) estimation using two-stage least squares (2SLS). FDI and those in the interaction terms are instrumented by stock return correlation, changes in real exchange rates, capital account openness of the target country, country governance of the target country, market capitalization to GDP ratio of the target country, and geographic distance. The coefficient on FDI is smaller than that in column (10), the coefficient on the interaction term between FDI and industrial concentration is around twice of that in column (10), and the coefficient on the interaction term between FDI and the high-R&D deal ratio is more than twice of that in column (10). All other statistically significant coefficients have a similar magnitude to those in column

(10).

To summarize, the effect of the informativeness of FDI on the sensitivity of FPI to FDI is robust to different combinations of control variables. The effect is also fairly stable across different specifications. Therefore, the empirical findings provide robust support to the model's predictions.

1.5 Robustness Tests

1.5.1 Robust Regressions

To address the concerns on influences of outliers, I apply the robust regression, which is less sensitive to outliers than OLS. To save space, Table 1.4 reports results from regressions with two informativeness measures and all of the control variables as regressors.

Column (1) in Table 1.4 includes the same regressors as column (10) in Table 1.3, which is the OLS regression. Although the coefficient on the interaction term for the high-R&D deal ratio is statistically insignificant in the robust regression, the interaction term for the industrial concentration remains statistically significant. Regarding the control variables, the coefficient on the pairwise stock return correlation is positive and statistically significant in the robust regression, suggesting that investors hold more assets in a target country in which the stock returns have a higher correlation with those of their domestic stock markets.[18] Although this finding does not provide support for the risk diversification of international portfolio investment in theoretical studies, it accords with some empirical studies in the existing literature: Aviat and

[18]As another test, I also use the correlation between the monthly MSCI returns of target country j and the MSCI world returns over the past five years before year t to measure the stock return correlation. The results are similar.

Coeurdacier (2007) find a positive association between bilateral banking asset holdings and stock return correlation, and Lane and Milesi-Feretti (2008) also document a positive association between bilateral portfolio holdings and stock return correlation. The coefficient on the geographic distance is negative and statistically significant, which is consistent with the results in the previous research on the home bias puzzle (see, among others, Grinblatt and Keloharju, 2001; Chan, Covrig, and Ng, 2005).

In column (2), I include the high-tech deal ratio as an alternative informativeness measure to the high-R&D deal ratio, and the coefficient on the interaction term for the high-tech deal ratio is statistically insignificant. When I use the deal value concentration as an alternative measure to the industrial concentration, the interaction terms for high-R&D deal ratio and high-tech deal ratio are statistically significant, as shown in columns (3) and (4), respectively. Regarding the coefficient estimates for the control variables in columns (2), (3), and (4), results are similar to those in column (1) even if I include different informativeness measures in these regressions. In summary, although the economic magnitude of the interaction terms is weaker in the robust regressions, the results are still consistent with the model's prediction.

1.5.2 Panel VARs

In the theoretical model and the above empirical tests, the causal relationship runs from FDI to FPI, which may be justified by the observation that investors have control over the overseas subsidiaries when making FDI and thus may obtain information about the returns of making investment in foreign target countries. To further explore the effects of informativenss of FDI and the relationship between FPI and FDI, as an additional robustness test, I present the results from the Panel VAR specification (Holtz-Eakin, Newey, and Rosen, 1988), in which no restrictions are imposed on the causal relationship between FPI and FDI. Because I focus on the effects of informativeness of the FDI signals on the sensitivity of FPI to FDI, which are captured

by the coefficients on the interaction terms between the informativeness measures and FDI, I apply the following two approaches.

In the first approach, following Love and Zicchino (2006) and Powell, Ratha, and Mohapatra (2002), I divide the data into two subsamples based on the median of each informativeness measure and estimate two sets of Panel VARs separately, in which each informativeness measure is below and above the median, respectively. Table 1.5 reports the results for the bivariate Panel VAR with two lags of FPI and FDI when the industrial concentration is investigated, and Figure 1.1 shows the corresponding orthogonalized impulse responses for these two subsamples. When the industrial concentration is below the median, the orthogonalized impulse response of FPI to the shock of FDI (Figure 1.1, Panel A, bottom left) first rises, then slowly dies away; this implies that when FDI has a high degree of informativeness, FDI shock has a subsequently positive impact on FPI and that this positive impact slowly disappears as time passes by. In contrast, when the industrial concentration is above the median, the orthogonalized impulse response of FPI to the shock of FDI (Figure 1.1, Panel B, bottom left) rises upon receiving the shock, quickly declines below zero, and then slowly goes back to zero; the magnitude of the impulse response is smaller compared to that when the industrial concentration is below the median. These distinct patterns imply that when FDI provides less information that helps investors predict the returns of FPI in the target country, an increase in FDI leads to a smaller increase in FPI, which provides evidence to support the model's prediction.

When investigating the value concentration, the high-R&D deal ratio, and the high-tech deal ratio, I also find patterns that are consistent with the model's prediction. Table 1.6 and Figure 1.2 (Panel A, bottom left; Panel B, bottom left) demontrate the case for the high-R&D deal ratio. In order to save space, the results for the value concentration and the high-tech deal ratio are omitted in the main text.

In the second approach, I take the interaction term as an endogenous variable and estimate trivariate Panel VARs. In each Panel VAR, I include two lags of each endogenous variable. Regarding the ordering of the variables, I assume that FDI is the most exogenous variable and that it is followed by the interaction term. I also assume that FPI responds to the interaction term contemporaneously and that if there is any feedback effect from FPI to the interaction term it is likely to happen with a lag. When the industrial concentration is examined, the estimation result is reported in Panel A of Table 1.7. Corresponding to this estimation, as shown in Figure 1.3 (bottom middle), the orthogonalized impulse response of FPI to the shock of the interaction term between the industrial concentration and FDI first drops below zero, then declines even further, and finally slowly converges to zero. This pattern is consistent with the results from the pooled OLS regressions, robust regressions, and the first approach.

When the high-R&D deal ratio is examined, Panel B of Table 1.7 and Figure 1.4 present the estimation results and the set of impulse responses, respectively. The impulse response of FPI shows the opposite pattern to that when the industrial concentration is examined: It first rises above zero, then continues to increase, and finally converges to zero (Figure 1.4, bottom middle). This pattern implies that for a higher degree of informativeness an increase in FDI in the previous year leads to a greater increase in FPI, which is consistent with the model's prediction. I conduct further tests using the value concentration and the high-tech deal ratio, and the orthogonalized impulse response of FPI to the corresponding shocks provides additional evidence to support the model's prediction.

In some cases, the estimation results and the corresponding impulse responses also suggest a positive causality running from FPI to FDI. This finding is consistent with the results in Ferreira, Massa, and Matos (2009), which suggest that FPI and FDI are complements and that the causal

relation is running from FPI to FDI: Portfolio investment builds bridges between firms internationally so that FPI actually facilitates cross-border M&As. These findings point to future research on the theoretical framework to incorporate them.

1.5.3 TIC Data

In this section, I use an alternative data set, namely the TIC data, to further test the robustness of the model's predictions. I conduct the same exercises as those for the CPIS data using the corresponding variables based on the TIC data. In order to save space, I include two informativeness measures and all of the control variables as the regressors in each regression. For the purpose of comparison, both the results from pooled OLS regressions and those from robust regressions are reported in Table 1.8: Columns (1), (3), (5), and (7) present those from pooled OLS regressions, and columns (2), (4), (6), and (8) display those from robust regressions.

As shown in column (1), the coefficients on the interaction terms between the informativeness measures and FDI bear the expected signs and are statistically significant. Column (2) indicates that, in the robust regression, the coefficients on the interaction terms are also statistically significant, although the economic magnitude is smaller than that in column (1). When I use the deal value concentration as an alternative to the industrial concentration to measure informativeness, as shown in columns (5) to (8), the coefficients on the interaction terms of the deal value concentration are also statistically significant. The coefficients on the interaction terms of the high-R&D deal ratio and the high-tech deal ratio are statistically significant in the robust regressions.

Regarding the additional control variables in the regressions, similar to the results based on the CPIS data, in the robust regressions, FPI is positively associated with the pairwise stock return correlation between the target country and the acquirer country. In contrast to the results from the

CPIS data, the coefficients on the target country's market capitalization to GDP ratio are positive and statistically significant in all the regressions, and in the robust regressions the coefficients on the target country's turnover ratio are positive and statistically significant, which may suggest that the FPI of U.S. residents, on average, might not be correlated with the sentiment factor in the target country.

As an additional test, I estimate Panel VAR models for the TIC data; however, the impulse responses of FPI to the relevant shocks do not display clear-cut patterns. One possible reason may be that the number of panels is very limited for the TIC data and that Panel VAR models require a large number of panels.

1.5.4 Averages vs. Deviations of FDI

In the previous sections, I show that the total amount of FDI provides information for investors to predict returns of the target country. One question follows: Regarding the informativeness of FDI, do different components of FDI have differential impacts on investors' portfolio allocations? Or, specifically, does FPI have different correlations with the interaction terms between the informativeness measures and two components of FDI, namely the average of FDI and the deviation of FDI from the corresponding sample average?

In order to answer this question, I regress the proportion of FPI on the average proportion of FDI over the available time periods, the deviation of the proportion of FDI from the corresponding average, and their corresponding interaction terms with the informativeness measures. Table 1.9 presents the results for the two data sets: columns (1) and (2) for the CPIS data and columns (3) and (4) for the TIC data. For the CPIS data, both the average and the deviation of FDI are positively correlated with FPI. As shown in column (1), the coefficients on the interaction terms between the informativeness measures and the average FDI have the expected signs and are

statistically significant. In column (2), the coefficient on the interaction terms between the high-R&D deal ratio and the deviation of FDI is negative. This may suggest that the high-R&D deal ratio may help investors to correct the over-adjustment in FPI in the previous year. As shown in columns (3) and (4), the TIC data demonstrate similar results to those for the CPIS data.

1.6 Concluding Remarks

In this paper, I develop a model to demonstrate a mechanism that can alleviate investors' information asymmetry when they make portfolio investment overseas, that is, investors can extract information about the returns of making FPI in foreign countries from FDI. The model predicts that FPI and FDI are complements and that, more importantly, the informativeness of FDI strengthens the complementarity. I construct measures for the informativeness of FDI and provide evidence that supports the model's prediction. The effects of the informativeness of FDI are robust to various control variables and to different estimation specifications.

My paper suggests that real investment and financial investment, in the international context, are linked through an information channel. These findings have rich policy implications. Since home bias continues to exist, the global risk sharing between domestic and foreign investors is still insufficient, and a high degree of home bias increases the cost of capital (Lau, Ng, and Zhang, 2010). To reduce the home bias and thereby the cost of capital, one important policy may be to provide incentives for domestic investors to make portfolio investment abroad. In addition, another important aspect of the policy might be to promote financial innovation that can facilitate domestic firms to make FDI overseas.

The findings also suggest that policy makers may take into account the learning effects when evaluating policies. Financial market infrastructures and monetary policies that influence FDI

can also affect international portfolio equity flows through the learning mechanism. For example, coordination in regulation and supervision of different jurisdictions may have impact on FDI of multinational companies. Through the learning mechanism, it may also affect FPI. Thus, when addressing issues on international framework for regulation and supervision, policy makers may also take into account the impact on international portfolio investment.

The findings of this paper also point to new avenues for future research. First, one interesting question is how the volatility of portfolio investment is associated with that of cross-border M&As and information flows. The issue is particularly relevant as capital flow volatility can increase financial system vulnerabilities and magnify macroeconomic instability. Therefore, it is important to study the joint volatility of FPI and FDI, especially how the informativeness of FDI affects this relationship over business cycles in general and during extreme periods such as global financial crises.[19] The CPIS data only cover a short time period and have low frequency. As these limitations on data availability are alleviated, investigations of the these issues could be greatly improved.

Another interesting study could be to investigate the interconnectedness and characteristics of target firms and acquirer firms involved in cross-border M&As and their impact on financial stability. The existing research suggests that target countries can benefit from cross-border M&As: These transactions can improve the corporate governance within target firms, and target firms experience abnormal returns when they are acquired by firms operating in an environment with better institutional quality (e.g., Rossi and Volpin, 2004; Bris and Cabolis, 2008). However,

[19]Forbes and Warnock (2011) find that contagion through bilateral banking claims, based on the data from the Bank for International Settlements, is important in determining stop and retrenchment episodes of capital flows.

the linkages between the headquarters and the overseas subsidiaries can also act as a transmission mechanism that spreads the crisis across countries. Therefore, detailed analyses of the interconnectedness of headquarters and overseas subsidiaries could provide new insight into financial stability and the redesign of the financial supervisory architecture.

Finally, the data show that there are some zero observations in FPI or cross-border M&As or both for some country pairs in some years. Intuitively, the factors that may lead to these zero observations could represent political risks, investment regulations and restrictions, transaction costs, and so on. These factors could act like certain types of fixed costs that are so high for these country pairs that they prohibit FPI or cross-border M&As between them. These types of fixed costs are of importance to the globally integrated financial markets, and thus it could be worthwhile to study the impacts of these types of fixed costs in a framework with both FPI and cross-border M&As.

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Figure 1.1

Bivariate Panel VAR model of FDI and FPI: industrial concentration.

This figure plots the orthogonalized impulse responses for the bivariate Panel VAR with two lags of FPI and FDI. Panel A and Panel B show the results for the samples with the informativeness measure industrial concentration below the median and above the median, respectively. The time scale on the horizontal axis is expressed in years. For each impulse responses, the 95% confidence intervals are plotted, which are computed by Monte Carlo simulation with 1000 repetitions. Table 1.5 reports the corresponding estimation results.

Panel A: industrial concentration below the median

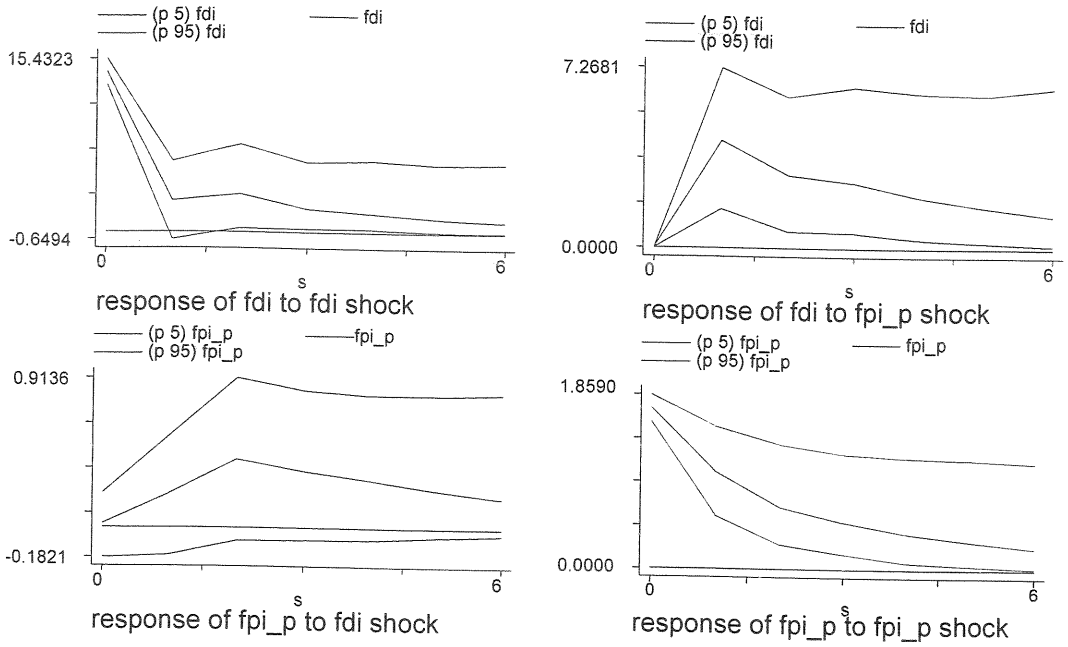

Figure 1.1 (continued)
Bivariate Panel VAR model of FDI and FPI: industrial concentration.

Panel B: industrial concentration above the median

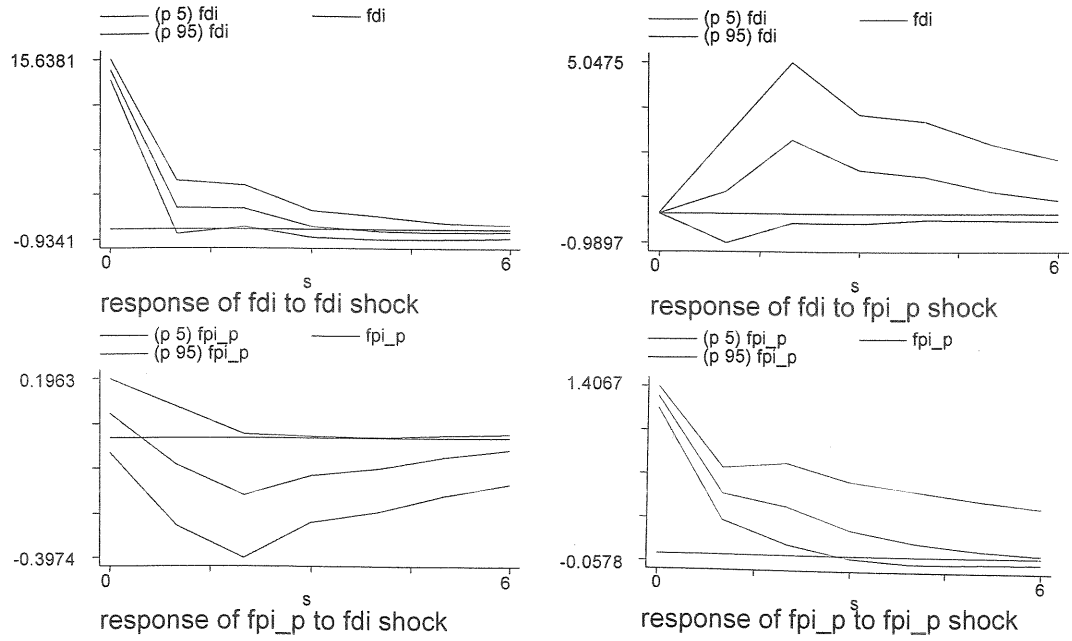

Figure 1.2

Bivariate Panel VAR model of FDI and FPI: high-R&D deal ratio.

This figure plots the orthogonalized impulse responses for the bivariate Panel VAR with two lags of FPI and FDI. Panel A and Panel B show the results for the samples with the informativeness measure the high-R&D deal ratio below the median and above the median, respectively. The time scale on the horizontal axis is expressed in years. For each impulse responses, the 95% confidence intervals are plotted, which are computed by Monte Carlo simulation with 1000 repetitions. Table 1.6 reports the corresponding estimation results.

Panel A: high-R&D deal ratio below the median

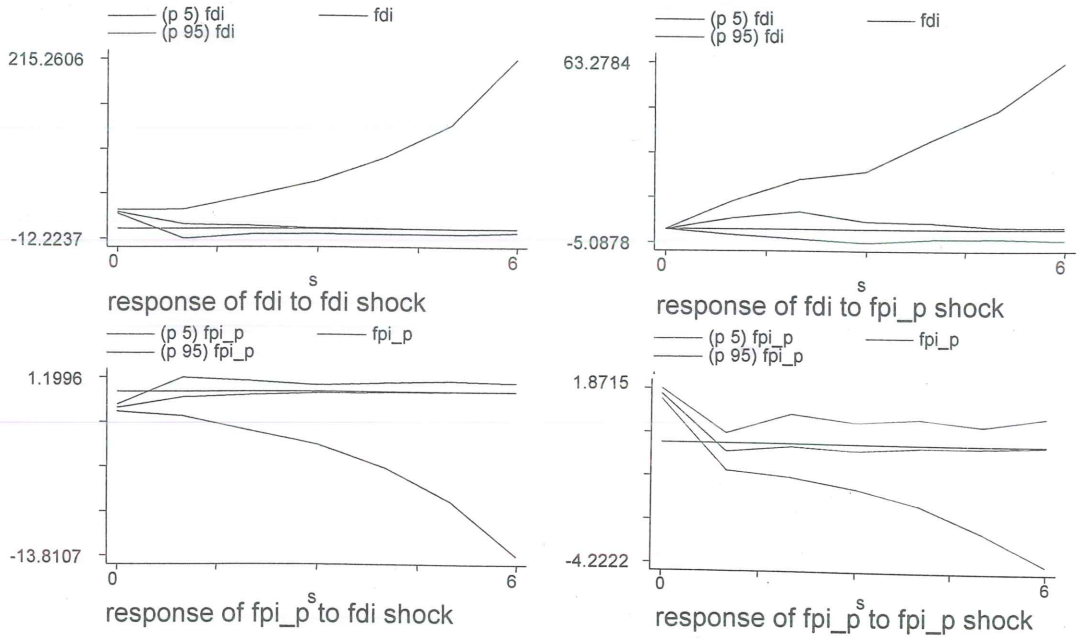

Figure 1.2 (continued)
Bivariate Panel VAR model of FDI and FPI: high-R&D deal ratio.

Panel B: high-R&D deal ratio above the median

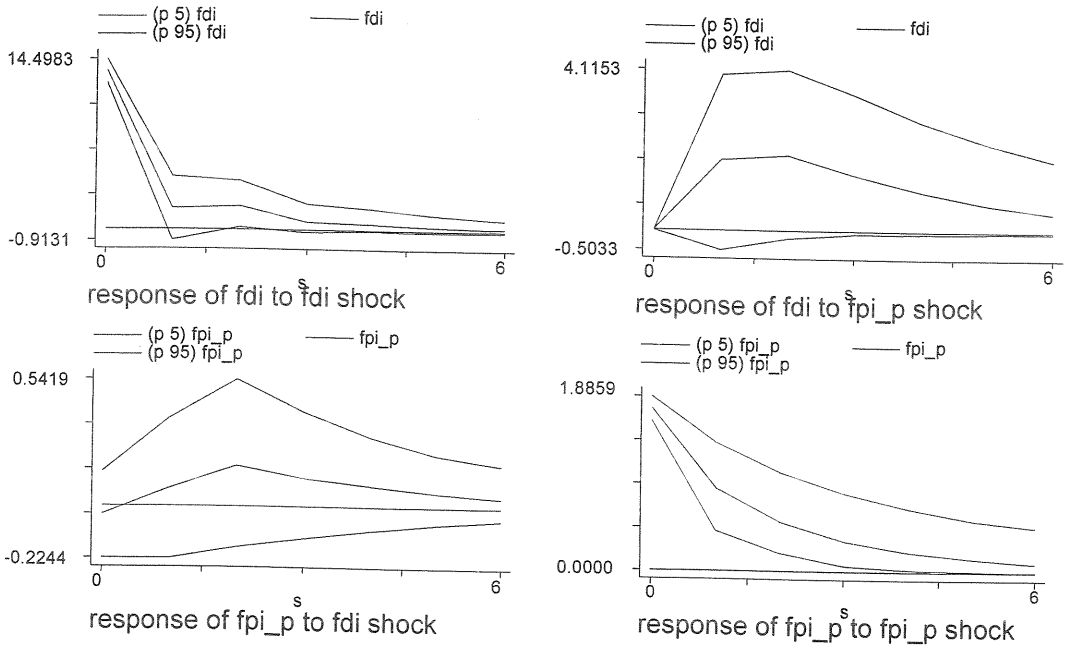

Figure 1.3

Trivariate Panel VAR model: FDI, FDI×industrial concentration, and FPI.

This figure plots the orthogonalized impulse responses for the trivariate Panel VAR with two lags of FDI, the interaction term between FDI and the industrial concentration (represented by v_ind in the figure), and FPI. The time scale on the horizontal axis is expressed in years. For each impulse responses, the 95% confidence intervals are plotted, which are computed by Monte Carlo simulation with 1000 repetitions. Table 1.7 Panel A reports the corresponding estimation results.

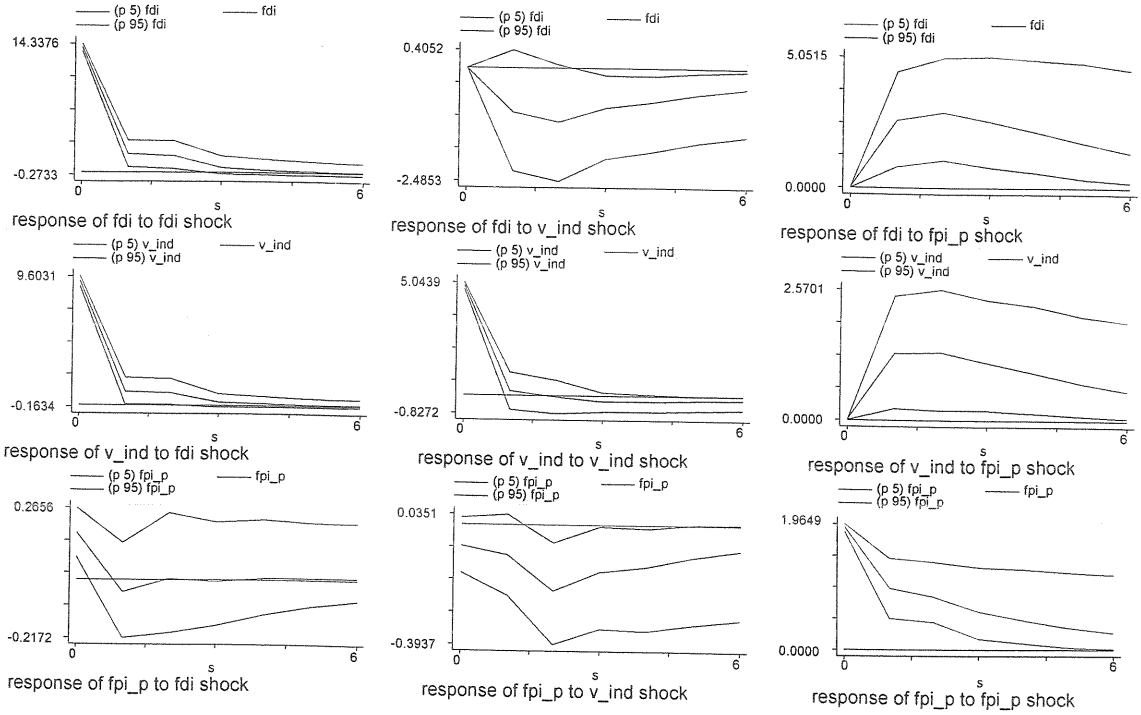

Figure 1.4

Trivariate Panel VAR model: FDI, FDI×high-R&D deal ratio, and FPI.

This figure plots the orthogonalized impulse responses for the trivariate Panel VAR with two lags of FDI, the interaction term between FDI and the high-R&D deal ratio (represented by v_rd in the figure), and FPI. The time scale on the horizontal axis is expressed in years. For each impulse responses, the 95% confidence intervals are plotted, which are computed by Monte Carlo simulation with 1000 repetitions. Table 1.7 Panel B reports the corresponding estimation results.

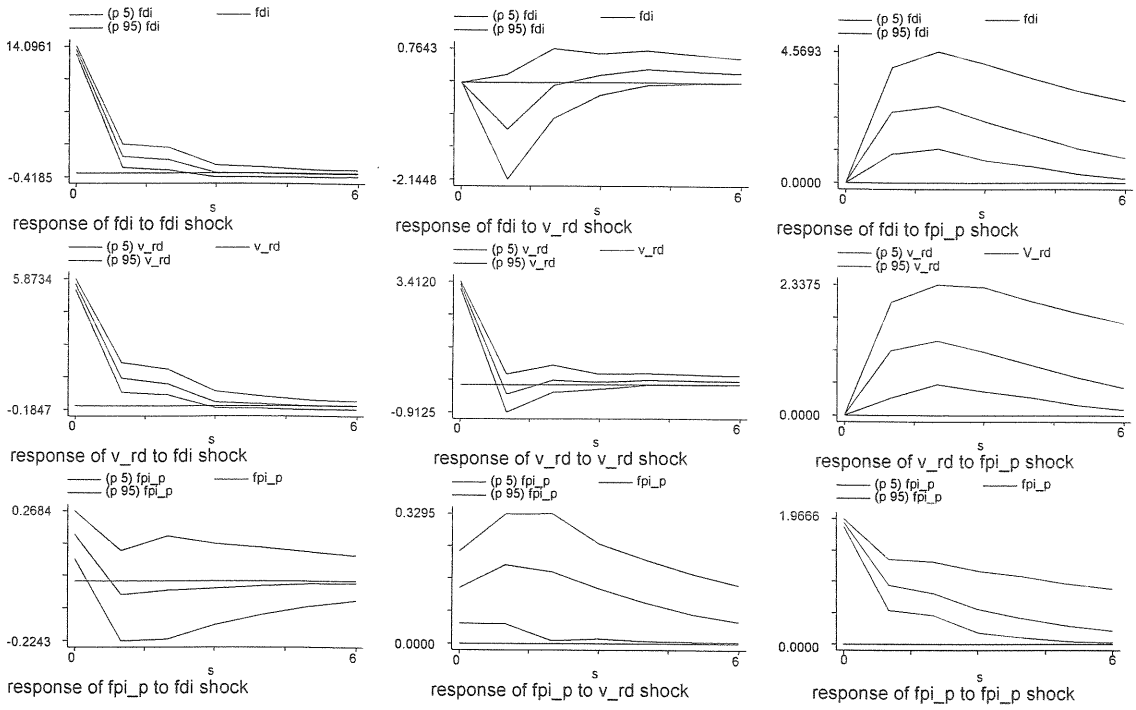

Table 1.1

Pooled OLS regression analysis of FPI and FDI: CPIS data.

This table reports results from pooled OLS regressions of FPI on FDI and the informativeness measures. The dependent variable is the proportion of FPI holdings computed from the CPIS data. All of the independent variables are lagged 1 year. Details on variable construction are described in Section 1.3.2. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI	0.7948***	0.7140***	0.1567***	0.2003***	0.6742***	0.6755***	0.5744***	0.5934***
	(0.1070)	(0.0977)	(0.0538)	(0.0424)	(0.1049)	(0.1013)	(0.0873)	(0.0863)
Industrial Concentration	-5.0290***				-5.1635***	-5.2455***		
	(1.3042)				(1.2785)	(1.2669)		
Industrial Concentration×FDI	-0.7252***				-0.6872***	-0.6636***		
	(0.1109)				(0.1060)	(0.1047)		
Value Concentration		-4.3166***					-4.3898***	-4.4999***
		(1.2244)					(1.1942)	(1.1781)
Value Concentration×FDI		-0.6686***					-0.6379***	-0.6133***
		(0.1032)					(0.0948)	(0.0924)
High-R&D Deal Ratio			-0.3450		-0.2804		-0.5247	
			(0.6797)		(0.5340)		(0.5535)	
High-R&D Deal Ratio×FDI			0.3972**		0.2291*		0.2933***	
			(0.1633)		(0.1180)		(0.1118)	
High-tech Deal Ratio				0.1535		0.3215		0.2348
				(1.1001)		(0.9366)		(0.9503)
High-tech Deal Ratio×FDI				0.7628***		0.4891***		0.5493***
				(0.2436)		(0.1695)		(0.1675)
Observations	3222	3237	3230	3237	3222	3222	3230	3237
R^2	0.2954	0.2745	0.1717	0.1857	0.3016	0.3092	0.2842	0.2916

Table 1.2

"Beta" coefficients.

This table reports the "beta" coefficients for the relevant explanatory variables in regression (5) in Table 1.1 and regression (1) in Table 1.3, along with the sample means and standard deviations of the relevant variables. A beta coefficient converts the regression coefficients into units of sample standard deviations.

			Regression (5) in Table 1.1		Regression (1) Table 1.3	
	Mean	Standard Deviation	Coefficient estimate	"Beta" coefficient	Coefficient estimate	"Beta" coefficient
FPI: dependent variable	3.0424	8.4717				
FDI	8.2198	15.1701				
Industrial Concentration	0.7643	0.2760				
High-R&D Deal Ratio	0.3913	0.3586				
Differences in Stock Returns	0	0.3041				
Industrial Concentration×FDI			-0.6872	0.2668	-0.6908	0.2325
Industrial Concentration decreases by one standard deviation				0.6064		0.5739
High-R&D Deal Ratio×FDI			0.2291	1.2524.	0.2423	1.3477
High-R&D Deal Ratio decreases by one standard deviation				1.4462		1.5033
Differences in Stock Returns					6.9830	0.2507

Table 1.3

Regression analysis of FPI and FDI: additional control variables.

This table reports the results from regressions of FPI on FDI, the informativeness measures, and additional control variables. Pooled OLS regressions are presented in columns (1) to (10), and the results from the IV estimation using 2SLS are reported in column (11). The dependent variable is the proportion of FPI holdings computed from CPIS. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FDI	0.6578***	0.6543***	0.6685***	0.6635***	0.6467***	0.6597***	0.5903***	0.6516***	0.6517***	0.5852***	0.4314*
	(0.1035)	(0.1041)	(0.1043)	(0.1030)	(0.1035)	(0.1048)	(0.0998)	(0.1024)	(0.1035)	(0.0979)	(0.2586)
Industrial Concentration	-5.2962***	-5.5409***	-5.3679***	-5.1904***	-4.3331***	-5.0359***	-4.3926***	-4.4306***	-5.0062***	-2.8574**	-0.1898
	(1.3245)	(1.3575)	(1.3459)	(1.2836)	(1.2546)	(1.3466)	(1.2078)	(1.3614)	(1.2933)	(1.2770)	(2.8723)
Industrial Concentration×FDI	-0.6908***	-0.6934***	-0.6916***	-0.6960***	-0.6750***	-0.6941***	-0.6463***	-0.6864***	-0.6757***	-0.6277***	-1.1777***
	(0.1050)	(0.1053)	(0.1053)	(0.1047)	(0.1051)	(0.1063)	(0.1022)	(0.1032)	(0.1066)	(0.1010)	(0.2858)
High-R&D Deal Ratio	-0.2385	-0.1354	-0.1453	0.1216	-0.1039	-0.2604	0.3250	-0.3687	-0.6747	0.3244	-1.8458
	(0.5373)	(0.5362)	(0.5309)	(0.5378)	(0.5292)	(0.5646)	(0.5547)	(0.5458)	(0.5516)	(0.5714)	(1.8906)
High-R&D Deal Ratio×FDI	0.2423**	0.2424**	0.2276*	0.2291*	0.2185*	0.2385*	0.2361*	0.2383*	0.2494**	0.1981*	0.5639*
	(0.1211)	(0.1215)	(0.1227)	(0.1209)	(0.1190)	(0.1226)	(0.1196)	(0.1249)	(0.1175)	(0.1196)	(0.3210)
Differences in Stock Returns	6.9830***	6.2026***	6.2280***	5.2356***	5.0045***	6.7456***	4.4817***	7.3463***	6.9146***	2.0490**	3.6449***
	(1.2457)	(1.1802)	(1.1744)	(1.1905)	(1.1152)	(1.2331)	(1.0160)	(1.2860)	(1.2279)	(0.9843)	(1.1459)
Stock Return Correlation	0.1330	1.1043	0.1485	-1.8577	-0.2333	0.2523	-2.1255	0.0947	2.8637	-2.7535	
	(2.1105)	(2.0746)	(2.1248)	(2.2456)	(1.9667)	(2.1102)	(2.2066)	(2.0807)	(2.0609)	(2.1107)	
Stock Return volatility		0.0708*								0.1093**	0.1518***
		(0.0441)								(0.0499)	(0.0377)
Real Exchange Rate			7.4768**							7.2757**	
			(2.9269)							(2.9737)	
Capital Account Openness: source				2.0326***						0.1094	0.1504
				(0.2437)						(0.3003)	(0.2551)
Capital Account Openness: target				-0.0848						0.9277*	
				(0.4257)						(0.5418)	
Country Governance: source					0.2991***					0.2551***	0.2845***
					(0.0416)					(0.0471)	(0.0358)
Country Governance: target					-0.0278					-0.0693	
					(0.0456)					(0.0647)	
Market Capitalization/GDP: source						0.0167***				-0.0062	-0.0008
						(0.0040)				(0.0040)	(0.0040)
Market Capitalization/GDP: target						-0.0033				0.0052	
						(0.0082)				(0.0089)	
Turnover Ratio: source							0.0717***			0.0788***	0.0907***
							(0.0090)			(0.0091)	(0.0081)
Turnover Ratio: target							-0.0138*			-0.0067	-0.0211***
							(0.0070)			(0.0071)	(0.0060)
Common Language								3.0380**		3.8881***	4.4608***
								(1.2897)		(1.2820)	(0.7130)
Geographic Distance									0.0003***	0.0002**	
									(0.0001)	(0.0001)	
Observations	3186	3186	3108	3117	3117	3061	3059	3186	3186	2838	2838
R^2	0.3227	0.3252	0.3281	0.3503	0.3686	0.3307	0.3976	0.3325	0.3342	0.4708	0.2192

Table 1.4

Robust regressions: CPIS data.

This table reports the results from the robust regression. The dependent variable is the proportion of FPI holdings, and the independent variables include FDI, the informativeness measures, and additional control variables. Details on variable construction are described in Section 1.3.2. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Standard errors are calculated using the pseudovalues approach described in Street, Carroll, and Ruppert (1988). According to Street, Carroll, and Ruppert (1988), the saved R-squared and the adjusted R-squared that are leftover from the pseudovalue regression are not meaningful and should not be used. Therefore, the R-squareds are computed using the program, rregfit, which is written by UCLA Statistical Consulting. ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
FDI	0.3070***	0.3040***	0.1382***	0.1433***
	(0.0073)	(0.0066)	(0.0066)	(0.0059)
Industrial Concentration	-0.7260***	-0.7299***		
	(0.1631)	(0.1637)		
Industrial Concentration×FDI	-0.2814***	-0.2818***		
	(0.0076)	(0.0076)		
Value Concentration			-1.0282***	-1.0329***
			(0.1553)	(0.1552)
Value Concentration×FDI			-0.1222***	-0.1269***
			(0.0073)	(0.0074)
High-R&D Deal Ratio	0.1219		0.0470	
	(0.1250)		(0.1265)	
High-R&D Deal Ratio×FDI	-0.0125		0.0166**	
	(0.0084)		(0.0084)	
High-tech Deal Ratio		0.0518		-0.0142
		(0.1775)		(0.1791)
High-tech Deal Ratio×FDI		-0.0030		0.0309**
		(0.0129)		(0.0129)
Differences in Stock Returns	0.4191**	0.4227***	0.3711**	0.3722**
	(0.1637)	(0.1640)	(0.1656)	(0.1654)
Stock Return Correlation	1.2687***	1.2708***	1.3377***	1.3511***
	(0.2534)	(0.2538)	(0.2565)	(0.2559)
Stock Return volatility	-0.0038	-0.0041	-0.0011	-0.0013
	(0.0047)	(0.0047)	(0.0048)	(0.0048)
Real Exchange Rate	0.4602	0.4685	0.6982	0.6968
	(0.4792)	(0.4800)	(0.4848)	(0.4839)
Capital Account Openness: source	0.2381***	0.2366***	0.2521***	0.2524***
	(0.0537)	(0.0538)	(0.0543)	(0.0542)
Capital Account Openness: target	0.1350***	0.1338***	0.1524***	0.1501***
	(0.0499)	(0.0501)	(0.0506)	(0.0505)
Country Governance: source	0.0461***	0.0462***	0.0460***	0.0456***
	(0.0067)	(0.0067)	(0.0068)	(0.0068)
Country Governance: target	-0.0048	-0.0048	-0.0090	-0.0094
	(0.0067)	(0.0067)	(0.0068)	(0.0068)
Market Capitalization/GDP: source	-0.0026***	-0.0026***	-0.0024***	-0.0024***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Market Capitalization/GDP: target	-0.0005	-0.0006	0.0002	0.0003
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Turnover Ratio: source	0.0063***	0.0063***	0.0072***	0.0071***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Turnover Ratio: target	-0.0002	-0.0002	0.0001	0.0001
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Common Language	0.3651***	0.3630***	0.3967***	0.3970***
	(0.0940)	(0.0944)	(0.0950)	(0.0951)
Geographic Distance	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	2838	2838	2843	2850
R^2	0.1226	0.1225	0.1190	0.1190

Table 1.5

Bivariate Panel VAR model of FDI and FPI: industrial concentration.

This table reports the results from a bivariate Panel VAR model, which is estimated by GMM with country-pair-year and fixed effects removed prior to estimation. Observations are divided into two subsamples based on the median value of industrial concentration. Panel A and Panel B are results for the subsamples with industrial concentration below and above the median, respectively. The coefficients of regressing the row variables on the column variables are reported. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Heteroskedasticity-adjusted standard errors are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Response of	Response to			
	FDI (t-1)	FDI (t-2)	FPI (t-1)	FPI (t-2)
Panel A: Industrial Concentration below the Median				
FDI (t)	0.1961	0.1655	2.5162**	-0.2908
	(0.1459)	(0.1221)	(0.9798)	(0.4447)
FPI (t)	0.0134	0.01796	0.6032***	-0.0128
	(0.0143)	(0.0130)	(0.1729)	(0.0626)
Observations	204			
Panel B: Industrial Concentration above the Median				
FDI (t)	0.1319	0.1043	0.5485	1.5756*
	(0.1033)	(0.0676)	(0.8066)	(0.8799)
FPI (t)	-0.0081	-0.0102*	0.3929	0.1667*
	(0.0076)	(0.0061)	(0.0969)	(0.0885)
Observations	316			

Table 1.6

Bivariate Panel VAR model of FDI and FPI: high-R&D deal ratio.

This table reports the results from a bivariate Panel VAR model, which is estimated by GMM with country-pair-year and fixed effects removed prior to estimation. Observations are divided into two subsamples based on the median value of high-R&D deal ratio. Panel A and Panel B are results for the subsamples with high-R&D deal ratio below and above the median, respectively. The coefficients of regressing the row variables on the column variables are reported. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Heteroskedasticity-adjusted standard errors are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Response of	Response to			
	FDI (t-1)	FDI (t-2)	FPI (t-1)	FPI (t-2)
Panel A: High-R&D Deal Ratio below the Median				
FDI (t)	0.4321	0.3218	2.5103	3.3939
	(0.5455)	(0.3827)	(2.3136)	(3.1258)
FPI (t)	-0.0337	-0.0078	-0.1758	-0.0073
	(0.0507)	(0.0384)	(0.2280)	(0.3391)
Observations	122			
Panel B: High-R&D Deal Ratio above the Median				
FDI (t)	0.1369	0.1256	1.0283	0.4295
	(0.1192)	(0.0773)	(0.7943)	(0.4856)
FPI (t)	0.0070	0.0092	0.5120***	0.0357
	(0.0132)	(0.0089)	(0.1648)	(0.1085)
Observations	233			

Table 1.7

Trivariate Panel VAR model: FDI, FDI×Informativeness, and FPI.

This table reports the results from a trivariate Panel VAR model, which is estimated by GMM with country-pair-year and fixed effects removed prior to estimation. The interaction term between the informativeness proxy and FDI are included in the estimation as an endogenous variable. Panels A and B are results for the informativeness measures industrial concentration and high-R&D deal ratio respectively. The coefficients of regressing the row variables on the column variables are reported. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Heteroskedasticity-adjusted standard errors are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Response of	Response to					
	FDI (t-1)	FDI (t-2)	FDI (t-1)× Informativeness (t-1)	FDI (t-2)× Informativeness (t-2)	FPI (t-1)	FPI (t-2)
	Panel A: Industrial Concentration					
FDI (t)	0.2547*	0.2031*	-0.1773	-0.1472	1.3776**	0.6062**
	(0.1328)	(0.1043)	(0.1542)	(0.1128)	(0.5683)	(0.2612)
FDI (t)×Industrial Concentration (t)	0.0334	0.0515	0.0465	0.0050	0.6913*	0.2752*
	(0.0757)	(0.0629)	(0.0997)	(0.0750)	(0.3608)	(0.1590)
FPI (t)	-0.0009	0.0215	-0.0131	-0.0312 **	0.5066***	0.1886**
	(0.0137)	(0.0142)	(0.0154)	(0.0146)	(0.1532)	(0.0785)
Observations	1160					
	Panel B: High-R&D Deal Ratio					
FDI (t)	0.2723**	0.1329*	-0.3648*	-0.0707	1.2984***	0.6459**
	(0.1076)	(0.0680)	(0.2101)	(0.1233)	(0.4862)	(0.2692)
FDI (t)× High-R&D Deal Ratio (t)	0.1349**	0.0543*	-0.1190	0.0280	0.6105**	0.2978**
	(0.0524)	(0.0322)	(0.1184)	(0.0730)	(0.2663)	(0.1456)
FPI (t)	-0.0263**	-0.0084	0.0394	0.0126	0.4901***	0.1925**
	(0.0132)	(0.0130)	(0.0268)	(0.0216)	(0.1317)	(0.0748)
Observations	1165					

Table 1.8

Pooled OLS regressions and robust regressions: TIC data.

This table reports results for the TIC data: Columns (1), (3), (5), and (7) are those from pooled OLS regressions and columns (2), (4), (6), and (8) are from robust regressions. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. For the TIC data, as the U.S. is the only source country and the value of capital account openness does not vary over the sample period, the explanatory variable capital account openness is omitted in the regressions. Regarding the robust regressions, standard errors are calculated using the pseudovalues approach described in Street, Carroll, and Ruppert (1988). According to Street, Carroll, and Ruppert (1988), the saved R-squared and the adjusted R-squared that are leftover from the pseudovalue regression are not meaningful and should not be used. Therefore, the R-squareds are computed using the program, rregfit, which is written by UCLA Statistical Consulting. Regarding the pooled OLS regressions, standard errors robust to heteroskedasticity and clustered by target country are reported in parentheses below regression coefficients. ***, **,* indicate statistical significance at the1 %, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI	0.7304***	0.2181***	0.9281***	0.2319***	0.7015***	0.2052***	0.8978***	0.2212***
	(0.1523)	(0.0150)	(0.0819)	(0.0112)	(0.1532)	(0.0149)	(0.0835)	(0.0111)
Industrial Concentration	-0.1207	-0.2733**	-0.1235	-0.3033**				
	(1.9814)	(0.1295)	(1.9326)	(0.1270)				
Industrial Concentration×FDI	-1.3303***	-0.3351***	-1.4553***	-0.3170***				
	(0.2274)	(0.0263)	(0.3106)	(0.0260)				
Value Concentration					-0.2377	-0.3248**	-0.2187	-0.3374***
					(2.0285)	(0.1301)	(1.9820)	(0.1274)
Value Concentration×FDI					-1.2900***	-0.3108***	-1.4055***	-0.3035***
					(0.2796)	(0.0273)	(0.3561)	(0.0268)
High-R&D Deal Ratio	-0.8003	-0.1771			-0.7724	-0.1638		
	(1.2996)	(0.1217)			(1.2572)	(0.1213)		
High-R&D Deal Ratio×FDI	1.4239*	0.3202***			1.3689	0.2900***		
	(0.8577)	(0.0353)			(0.8671)	(0.0352)		
High-tech Deal Ratio			-0.2642	-0.2471*			-0.2357	-0.2492*
			(1.4403)	(0.1374)			(1.4106)	(0.1366)
High-tech Deal Ratio×FDI			1.5701	0.3573***			1.4615	0.3270***
			(1.3199)	(0.0399)			(1.3122)	(0.0395)
Differences in Stock Returns	-0.5514	-0.0097	-0.5314	0.0004	-0.5752	-0.0031	-0.5646	0.0043
	(0.7485)	(0.1175)	(0.6997)	(0.1154)	(0.7469)	(0.1171)	(0.7012)	(0.1146)
Stock Return Correlation	-7.4363	0.6597***	-7.7052	0.6677**	-7.6974	0.6367**	-7.9522	0.6338**
	(4.7915)	(0.2565)	(4.8959)	(0.2505)	(4.8617)	(0.2571)	(4.9541)	(0.2502)
Stock Return volatility	-0.0110	0.0018	-0.0102	0.0018	-0.0101	0.0018	-0.0096	0.0019
	(0.0230)	(0.0033)	(0.0223)	(0.0032)	(0.0232)	(0.0033)	(0.0226)	(0.0032)
Real Exchange Rate	0.4055	0.2046	0.3886	0.1363	0.7400	0.2483	0.7481	0.2022
	(1.2504)	(0.4076)	(1.3561)	(0.3996)	(1.2098)	(0.4063)	(1.2852)	(0.3971)
Capital Account Openness: source								
Capital Account Openness: target	0.4627	0.0499*	0.4349	0.0496*	0.4779	0.0534*	0.4519	0.0550*
	(0.4205)	(0.0299)	(0.4165)	(0.0294)	(0.4221)	(0.0298)	(0.4178)	(0.0293)
Market Capitalization/GDP: source	-0.0105	-0.0023	-0.0119	-0.0021	-0.0121*	-0.0025	-0.0135*	-0.0024
	(0.0075)	(0.0018)	(0.0072)	(0.0017)	(0.0072)	(0.0018)	(0.0072)	(0.0017)
Market Capitalization/GDP: target	0.0170**	0.0045***	0.0171**	0.0043***	0.0175**	0.0046***	0.0177**	0.0045***
	(0.0075)	(0.0006)	(0.0074)	(0.0006)	(0.0076)	(0.0006)	(0.0075)	(0.0006)
Turnover Ratio: source	-0.0023	-0.0021*	-0.0015	-0.0017	-0.0032	-0.0022*	-0.0024	-0.0018
	(0.0064)	(0.0013)	(0.0070)	(0.0012)	(0.0062)	(0.0013)	(0.0067)	(0.0012)
Turnover Ratio: target	0.0032	0.0017**	0.0026	0.0019**	0.0030	0.0016**	0.0026	0.0018**
	(0.0066)	(0.0008)	(0.0052)	(0.0007)	(0.0068)	(0.0008)	(0.0054)	(0.0007)
Common Language	-0.5126	0.2587***	-0.7185	0.2439***	-0.4642	0.2485***	-0.6544	0.2350***
	(2.0995)	(0.0868)	(2.0720)	(0.0846)	(2.0801)	(0.0865)	(2.0528)	(0.0840)
Geographic Distance	0.0002	-0.00004***	0.0002	-0.00003***	0.0002	-0.00004***	0.0002	-0.00004***
	(0.0002)	(0.00001)	(0.0002)	(0.00001)	(0.0002)	(0.00001)	(0.0002)	(0.00001)
Observations	562	562	562	562	562	562	562	562
R^2	0.6702	0.3229	0.6687	0.3181	0.6654	0.3207	0.6630	0.3168

Table 1.9

Average vs. Deviation of FDI: CPIS and TIC data.

This table examines the different correlations of FPI with the average and deviation of FDI and the corresponding interaction terms between the informativeness measures and FDI. It reports the results from pooled OLS regressions. Columns (1) and (2) are results for the CPIS data, and columns (3) and (4) are those for the TIC data. Variable definitions and data sources are as described in Table 1.A.2, and summary statistics are reported in Table 1.A.3. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair (CPIS) or by the target country (TIC) are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1 %, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Average FDI	0.8827***	0.5561***	0.8991**	1.2801***
	(0.1662)	(0.0858)	(0.3550)	(0.3079)
Deviation FDI	0.0302**	0.2440***	0.1108**	0.4525*
	(0.0149)	(0.0716)	(0.0435)	(0.2539)
Industrial Concentration	-0.8167	-9.3081***	1.4446	1.1548
	(1.7775)	(1.3961)	(1.7892)	(1.6892)
Industrial Concentration×Average FDI	-0.8658***		-0.8316***	
	(0.1629)		(0.2009)	
Industrial Concentration×Deviation FDI		-0.2242***		-0.2324
		(0.0748)		(0.2608)
High-R&D Deal Ratio	-1.2660	1.7253***	-0.8587	1.0983
	(0.8088)	(0.6590)	(0.5196)	(0.7265)
High-R&D Deal Ratio×Average FDI	0.4731***		1.2993***	
	(0.1714)		(0.3372)	
High-R&D Deal Ratio× Deviation FDI		-0.1538**		-0.8551*
		(0.0778)		(0.4566)
Difference in Stock Returns	5.6755***	4.9871***	-0.6731	-0.7012
	(1.0637)	(1.1681)	(0.6864)	(0.6970)
Stock Return correlation	0.4678	0.6079	-8.7511*	-9.7572**
	(2.0586)	(2.2067)	(4.7969)	(4.7037)
Stock Return Volatility	0.0454	0.0196	-0.0192	-0.0105
	(0.0439)	(0.0467)	(0.0255)	(0.0255)
Observations	3186	3186	690	690
R^2	0.4094	0.3451	0.7469	0.7339

Table 1.A.1

Home bias levels.

This table reports the home bias levels for 27 countries. Columns (1) and (2) show the values of two measures of home bias for each country. Each measure is averaged over the six survey years (1997, 2001, 2002, 2003, 2004, and 2005). Source: Bekaert and Wang (2009), page 37.

	Country	(1)	Country	(2)
Least	United States	0.386	Netherlands	0.468
home	Netherlands	0.457	Norway	0.567
biased	Norway	0.565	Austria	0.574
	Austria	0.573	Denmark	0.630
	United Kingdom	0.626	Sweden	0.639
	Denmark	0.627	Belgium	0.664
	Sweden	0.633	New Zealand	0.687
	Belgium	0.659	Canada	0.689
	Canada	0.669	United Kingdom	0.689
	New Zealand	0.686	Argentina	0.720
	Singapore	0.717	Singapore	0.721
	Argentina	0.719	United States	0.727
	France	0.724	Finland	0.740
	Finland	0.736	France	0.757
	Italy	0.755	Italy	0.773
	Japan	0.792	Iceland	0.822
	Australia	0.814	Australia	0.829
	Iceland	0.821	Spain	0.852
	Spain	0.838	Portugal	0.876
	Portugal	0.874	Japan	0.896
	Israel	0.921	Israel	0.923
	Chile	0.957	Chile	0.960
	Venezuela	0.974	Venezuela	0.975
	South Korea	0.976	South Korea	0.985
Most	Malaysia	0.982	Malaysia	0.987
home	Thailand	0.989	Thailand	0.991
biased	Indonesia	0.997	Indonesia	0.998

Table 1.A.2

Definitions of variables.

This table describes the definitions and data sources of all the variables used in the regressions.

Variable	Definition
	Panel A: CPIS Data
FPI	The percentage of FPI holdings from country i in the total FPI liabilities of country j in year t. (Source: CPIS)
FDI: Transaction Values	Percentage of transaction values of deals, defined as the transaction values of deals involving target firms from country j and acquirer firms from country i as a percentage of the total transaction values of cross-border deals with target firms from country j in year t, where $j \neq i$. (Source: SDC)
FDI: Counts	Percentage of counts of deals, defined as the number of deals involving target firms from country j and acquirer firms from country i as a percentage of the total number of cross-border deals with target firms from country j in year t, where $j \neq i$. (Source: SDC)
Average of FDI	Average of the proportion of values of deals over the years available. (Source: SDC)
Deviation of FDI	Deviation of the proportion of values of deals in year t from the sample average. (Source: SDC)
Industrial Concentration	The sum of the squared transaction value shares of all target firms with the same four-digit SIC Codes, that is, $I_{ijt} = \sum_{d=1}^{D}\left(p_{d,ijt}\right)^2$, where $p_{d,ijt}$ is the share of transaction values in industry d with acquirer firms from country i and target firms from country j in year t, and D is the total number of different industries based on target firms' four-digit SIC Codes. (Source: SDC)
Deal Value Concentration	The sum of the squared transaction value share of each deal with target firm from country j. The transaction value share is defined as the transaction values of each deal as a percentage of the total transaction values of target country j. (Source: SDC)
High-R&D Deal Ratio	The proportion of deals where the target firm is in one of the high-R&D industries. The high-R&D industry is defined as the industry in which the ratio of R&D expenditures to total assets one year prior to the announcement of the M&As is above the median. (Source: SDC)
High-tech Deal Ratio	The proportion of high-tech deals in the total number of deals from acquirer country i targeting country j. A deal is defined as a high-tech deal if both the acquirer and the target are high-tech companies. (Source: SDC)
	Panel B: TIC Data
FPI	The percentage of FPI flows from the U.S. to country j in the total FPI flows to the 41 countries in year t. (Source: TIC)
FDI: Transaction Values	The transaction values of deals involving target firms from country j and acquirer firms from the U.S. as a percentage of the total transaction values of cross-border deals to the 41 target countries with acquirer firms from the U.S. in year t. (Source: SDC)
Average of FDI	Average of the proportion of values of deals over the years available. (Source: SDC)
Deviation of FDI	Deviation of the proportion of values of deals in year t from the sample average. (Source: SDC)
Industrial Concentration	The sum of the squared transaction value shares of all target firms with the same four-digit SIC Codes, that is, $I_{USjt} = \sum_{d=1}^{D}\left(p_{d,USjt}\right)^2$, where $p_{d,USjt}$ is the share of transaction values in industry d with acquirer firms from the U.S. and target firms from country j in year t, and D is the total number of different industries based on target firms' four-digit SIC codes. (Source: SDC)
Deal Value Concentration	The sum of the squared transaction-value share of each deal with target firms from country j in year t. The transaction-value share is defined as the transaction values of each deal as a percentage of the total transaction values of target country j with the U.S. (Source: SDC)
High-R&D Deal Ratio	The proportion of deals where the target firm is in one of the high- R&D industries. The high-contracting-cost industry is defined as the industry in which the ratio of R&D expenditures to total assets one year prior to the announcement of the M&As is above the median. (Source: SDC)
High-tech Deal Ratio	The proportion of high-tech deals in the total number of deals from the U.S. targeting country j. A deal is defined as a high-tech deal if both the acquirer and the target firms are high-tech companies. (Source: SDC)

Table 1.A.2 (continued)
Definitions of variables.

Variable	Definition
	Panel C: Additional Control Variables
Differences in Stock Returns between the Target Country and the Source Country	Annual returns of the target country minus those of the source country. The returns are calculated from the annual MSRI index denominated in U.S. dollars. (Source: Datastream)
Stock Return Correlation	Correlation between the monthly market returns of target country j and the MSCI world returns over the past five years before year t. (Source: Datastream)
Pairwise Stock Return Correlation	Pairwise correlation between returns of the target and acquirer countries over the past five years before year t. The returns are calculated from the annual MSRI index denominated in U.S. dollars. (Source: Datastream)
Relative Stock Return Volatility	Differences between the annualized stand deviation of the target country stock returns and that of the world market stock returns. The standard deviation of the stock returns of the target country is calculated using the monthly MSCI Return Index over the previous 5 years. The standard deviation of the stock returns of the world market is calculated using the monthly MSCI World Return Index over the previous 5 years. (Source: Datastream)
Real Exchange Rate	Annual changes in the real exchange rate. The real exchange rate is defined as the value of the acquirer country currency in terms of the target country currency. (Source: Penn World Tables 7.0)
Capital Account Openness	Chinn-Ito index of capital account openness. (Source: http://web.pdx.edu/~ito/Chinn-Ito_website.htm.)
Market Capitalization to GDP Ratio	The market capitalization of listed companies as a percentage of GDP. (Source: World Bank)
Turnover Ratio	The total value of shares traded during each year divided by the average market capitalization for the period. Average market capitalization is calculated as the average of the end-of-period values for the current period and the previous period. (Source: World Bank)
Country Governance	The average of the ten economic freedom scores measuring ten components of freedom. The ten components of economic freedom are: Business Freedom, Trade Freedom, Fiscal Freedom, Government Spending, Monetary Freedom, Investment Freedom, Financial Freedom, Property rights, Freedom from Corruption, and Labor Freedom. Tracked by *The Wall Street Journal* and The Heritage Foundation, the Index starts from 1995 and covers 183 countries. (Source: http://www.heritage.org/index/Explore.aspx?view=by-region-country-year)
Common Language	Common Language is defined by a dummy variable, which is equal to 1, if the target country and the source country share a common language, 0 otherwise. (Source: https://www.cia.gov/library/publications/the-world-factbook/index.html)
Geographic Distance	The variable "dist" from CEPII. (Source: http://www.cepii.fr/anglaisgraph/bdd/distances.htm)

Table 1.A.3

Summary statistics.

This table reports summary statistics for the variables used in the regressions. Variable definitions are described in Table A.2.

Variable	Mean	Standard Deviation	Min	Max	Observations
	Panel A: CPIS Data				
FPI	3.0424	8.4717	-7.2189	92.9567	11044
FDI: Transaction Values	8.2198	15.1701	0.0006	99.1838	3972
FDI: Counts	5.8343	8.3512	0.0656	77.7778	5657
Industrial Concentration	0.7643	0.2760	0.0499	1	3952
Deal Value Concentration	0.7376	0.2895	0.0275	1	3972
High-R&D Deal Ratio	0.3913	0.3586	0	1	5642
High-tech Deal Ratio	0.1487	0.2595	0	1	5657
	Panel B: TIC Data				
FPI	2.4390	7.1204	0	52.2298	1066
FDI: Transaction Values	3.2541	6.9989	0.0014	76.0032	799
Industrial Concentration	0.5438	0.3078	0	1	799
Deal Value Concentration	0.5290	0.3113	0.0320	1	799
High-R&D Deal Ratio	0.3451	0.3056	0	1	799
High-tech Deal Ratio	0.2166	0.2554	0	1	799
	Panel C: Additional Control Variables for CPIS Data				
Differences in Stock Returns	0	0.3041	-1.3387	1.3387	14112
Pairwise Stock Return Correlation	0.4565	0.1941	-0.2032	1	13780
Relative Stock Return Volatility	13.4143	12.2496	-2.4873	69.2718	13944
Real Exchange Rate	0.0071	0.1322	-0.6784	2.1092	14112
Capital Account Openness	1.4530	1.2961	-1.8081	2.5408	13776
Market Capitalization to GDP Ratio	86.6418	78.9683	9.8379	617.6384	14112
Turnover Ratio	81.4317	58.7013	0.1870	359.4998	14112
Country Governance	68.1184	9.4569	48.7291	89.9678	13776
Common Language	0.1542	0.3611	0	1	14112
Geographic Distance	7425.464	5186.487	9.5598	19772.34	14112
	Panel D: Additional Control Variables for TIC Data				
Differences in Stock Returns	0.0895	0.4905	-1.1372	7.4390	936
Pairwise Stock Return Correlation	0.4887	0.2041	-0.1973	0.9105	816
Relative Stock Return Volatility	13.3456	11.9666	-2.4873	75.3351	816
Real Exchange Rate	0.02597	0.1245	-0.8853	1.4294	974
Capital Account Openness: U.S.	2.4776	0	2.4776	2.4776	1025
Capital Account Openness: target	1.0357	1.5410	-1.8438	2.4776	965
Market Capitalization to GDP Ratio: U.S.	109.3073	36.3112	53.1730	178.853	902
Market Capitalization to GDP Ratio: target	72.1270	78.8635	0.0041	1088.282	879
Turnover Ratio: U.S.	137.6385	73.6708	48.5235	348.5814	902
Turnover Ratio: target	65.2729	51.8658	0.1697	376.5525	875
Common Language	0.2683	0.4433	0	1	1066
Geographic Distance	8443.921	3762.37	548.3946	16180.32	1066

Table 1.A.4

Correlation matrix: CPIS data.

This table reports the pairwise correlations of the variables for the CPIS data. * indicates significance at the 5% level. "s" stands for the source country, and "g" represents the target country.

	FPI	FDI	Industrial Concentration	Value Concentration	High-R&D Deal Ratio	High-tech Deal Ratio	Differences in Stock Returns	Stock Return Correlation	Stock Return volatility	Real Exchange Rate	Capital Account Openness: source	Capital Account Openness: target	Country Governance: source	Country Governance: target	Market Capitalization/GDP: source	Market Capitalization/GDP: target	Turnover Ratio: source	Turnover Ratio: target	Common Language	Geographic Distance
FPI	1.0000																			
FDI	0.3716*	1.0000																		
Industrial Con	-0.3267*	-0.1633*	1.0000																	
Value Con	-0.3095*	-0.1847*	0.9458*	1.0000																
High-R&D Ratio	0.0382*	-0.0139	-0.0631*	-0.0590*	1.0000															
High-tech Ratio	0.0565*	-0.0049	-0.0705*	-0.0667*	0.4663*	1.0000														
Diff Stock Returns	0.1250*	0.0956*	-0.0015	-0.0029	-0.0139	-0.0221	1.0000													
Return Correlation	0.1702*	0.0586*	-0.3025*	-0.2931*	0.0205	0.0416*	0.0000	1.0000												
Return volatility	0.0229*	0.1199*	0.1546*	0.1276*	-0.0450*	-0.0594*	0.2127*	-0.2153*	1.0000											
Real Exchange Rate	0.0172	0.0203	-0.0256	-0.0261	-0.0298*	-0.0056	-0.0076	-0.0300*	0.0961*	1.0000										
Capital Openness: s	0.2171*	0.1466*	-0.1325*	-0.1311*	-0.0594*	-0.0417*	0.1862*	0.2121*	0.0033	-0.0083	1.0000									
Capital Openness: g	-0.0219*	-0.0714*	-0.0986*	-0.0734*	0.0330*	0.0685*	-0.1862*	0.2121*	-0.6036*	-0.0292*	0.0054	1.0000								
Governance: s	0.2728*	0.1490*	-0.1979*	-0.1874*	-0.0224	-0.0259	0.1801*	0.2121*	-0.0046	0.0509*	0.6174*	-0.0030	1.0000							
Governance: g	0.2728*	0.1490*	-0.1979*	-0.1874*	-0.0224	-0.0259	0.1801*	0.2121*	-0.5315*	-0.0908*	-0.0030	0.6174*	0.0029	1.0000						
Market Cap/GDP: s	0.1136*	0.0411*	-0.1010*	-0.0910*	0.0193	-0.0233	0.1077*	0.1069*	-0.0384*	0.0814*	0.1776*	0.0004	0.5303*	-0.0017	1.0000					
Market Cap/GDP: g	-0.0157	-0.0815*	-0.0484*	-0.0419*	0.0725*	0.0260	-0.1077*	0.1069*	-0.2776*	-0.1012*	0.0004	0.1776*	-0.0017	0.5303*	0.0562*	1.0000				
Turnover Ratio: s	0.2604*	0.1698*	-0.2132*	-0.1912*	0.0206	0.0347*	0.0462*	0.1714*	-0.0434*	-0.0382*	0.1482*	-0.0082	0.1572*	0.0071	0.0310*	0.0196*	1.0000			
Turnover Ratio: g	-0.0196*	-0.1380*	-0.1758*	-0.1678*	0.0465*	0.0511*	-0.0462*	0.1714*	-0.0542*	-0.0025	-0.0082	0.1482*	0.0071	0.1572*	0.0196*	0.0310*	0.0367*	1.0000		
Common Language	0.2078*	0.0816*	-0.2031*	-0.1921*	0.0403*	0.0608*	-0.0001	0.2875*	-0.1275*	-0.0070	0.0288*	0.0264*	0.1833*	0.1837*	0.1240*	0.1269*	-0.0136	-0.0132	1.0000	
Geographic Distance	-0.0598*	-0.0841*	0.0442*	0.0444*	0.0625*	0.0070	0.0000	-0.3241*	0.0460*	0.0272*	-0.1374*	-0.1374*	0.0611*	0.0611*	0.0323*	0.0323*	-0.1467*	-0.1467*	-0.0816*	1.0000

Table 1.A.5

Correlation matrix: TIC data.

This table reports the pairwise correlations of the variables for the TIC data. * indicates significance at the 5% level. "g" represents the target country. Because the value of capital account openness of the United States (the source country) does not vary over the sample period, it is omitted in the calculations.

	FPI	FDI	Industrial Concentration	Value Concentration	High-R&D Deal Ratio	High-tech Deal Ratio	Differences in Stock Returns	Stock Return Correlation	Stock Return volatility	Real Exchange Rate	Capital Account Openness: target	Market Capitalization/GDP: U.S.	Market Capitalization/GDP: target	Turnover Ratio: U.S.	Turnover Ratio: target	Common Language	Geographic Distance
FPI	1.0000																
FDI	0.6899*	1.0000															
Industrial Con	-0.3003*	-0.3102*	1.0000														
Value Con	-0.3030*	-0.3207*	0.9629*	1.0000													
High-R&D Ratio	0.0647	0.0083	-0.0812*	-0.1024*	1.0000												
High-tech Ratio	0.0334	-0.0084	-0.1125*	-0.1340*	0.6435*	1.0000											
Diff Stock Returns	-0.0462	-0.0391	0.0601	0.0627	-0.0420	-0.0075	1.0000										
Return Correlation	0.1455*	0.2571*	-0.2081*	-0.2093*	0.1033*	0.2077*	0.0387	1.0000									
Return volatility	-0.2313*	-0.2225*	0.1486*	0.1448*	-0.2332*	-0.2021*	0.1295*	-0.3302*	1.0000								
Real Exchange Rate	-0.0048	0.0107	0.0400	0.0508	-0.0777*	-0.0385	-0.0049	0.0289	-0.0386	1.0000							
Capital Openness: g	0.2738*	0.2504*	-0.1931*	-0.2021*	0.2493*	0.2788*	-0.1249*	0.3655*	-0.5482*	-0.0440	1.0000						
Market Cap/GDP: U.S.	0.0000	-0.0840*	-0.2150*	-0.2342*	0.0870*	0.1427*	0.0031	0.0802*	0.0835*	-0.1658*	0.1579*	1.0000					
Market Cap/GDP: g	0.2102*	0.0738*	-0.0775*	-0.0680	0.0818*	0.0719	0.0294	0.2477*	-0.2190*	-0.0783*	0.2448*	0.2197*	1.0000				
Turnover Ratio: U.S.	0.0000	-0.0413	-0.0299	-0.0185	0.0768*	0.1434*	0.0732*	0.4488*	-0.0106	-0.0877*	0.1693*	0.3862*	0.1865*	1.0000			
Turnover Ratio: g	0.1047*	0.1027*	-0.2143*	-0.2158*	0.1319*	0.1170*	0.0636	0.1813*	0.0509	0.0376	0.1244*	0.1815*	0.0370	0.2558*	1.0000		
Common Language	0.2585*	0.2785*	-0.1689*	-0.1709*	0.0837*	0.0406	-0.0714*	0.1649*	-0.1921*	-0.0505	0.0744*	-0.0000	0.2980*	0.0000	-0.0847*	1.0000	
Geographic Distance	-0.1164*	-0.2888*	0.1534*	0.1594*	-0.0878*	-0.1150*	-0.0019	-0.2226*	0.2200*	-0.0462	-0.0775*	0.0000	0.2085*	-0.0000	-0.0294	0.3568*	1.0000

Table 1.A.6

Target and acquirer country list.

This table presents the target and source country names.

Argentina	France	South Korea	Singapore
Australia	Germany	Luxembourg	South Africa
Austria	Greece	Malaysia	Spain
Belgium	Hong Kong	Mexico	Sweden
Brazil	Hungary	Netherlands	Switzerland
Canada	India	New Zealand	Thailand
Chile	Indonesia	Norway	Turkey
Colombia	Ireland	Philippines	United Kingdom
Czech Republic	Israel	Poland	United States
Denmark	Italy	Portugal	
Finland	Japan	Russia	

CHAPTER 2

OUTBIDDING COMPETITORS WORLDWIDE: IMPERFECT CAPITAL MARKETS, EXCHANGE RATES, AND ASSET SALES

2.1 Introduction

Cross-border asset sales have experienced dramatic growth in the past decades.[1] During the period from 1986 to 1990, the average annual count and transaction values are 134 and 28.13 billion dollars, respectively. During the period from 2006 to 2010, the average count and transaction values have more than doubled, increasing to 289 and 63.46 billion dollars, respectively. In contrast, domestic asset sales did not significantly change during these two periods: 378 deals in counts and 48.97 billion dollars in transaction values over the first period and 685 deals and 77.90 billion over the second period.[2] As a result, cross-border asset sales have been playing an increasingly important role in reallocating resources around the world.

Despite the dramatic worldwide increases in cross-border asset sales, almost all of the studies on asset sales to date only focus on exclusively domestic asset sales or the cross-border ones involving a specific country (usually the U.S. as either the only acquirer country or the only target country).[3] In addition, limited studies have explored how cross-border asset sales are

[1]Several key features distinguish asset sales from mergers. Hege, Lovo, Slovin, and Sushka (2009) summarize the following (page 682). First, an asset sale is governed by contract law and the business judgment rule. Second, mergers are generally buyer-initiated, while asset sales are generally seller-initiated. Third, sellers of assets foster competitive and coetaneous bidding via an auction like process, followed by private negotiations between a seller and a selected buyer.

[2]Our calculations are based on data from Securities Data Corporation Platinum (SDC). To mitigate the influence of business cycles, we report the averages for two five-year periods: 1986-1990 and 2006-2010. Although only after 1992 does SDC cover deals of any value, our calculations may not be affected by the coverage of SDC as we impose certain restrictions to identify the asset sales. Table 2.A.3 details the searching criteria, and Table 2.4 reports the information on cross-border and domestic asset sales by year.

[3]For domestic asset sales, see, among others, Maksimovic and Phillips (2001, 2002); Jovanovic

affected by informational imperfections on the capital market (or financial development of a country). This issue is particularly important and relevant in a multi-country context, because (1) resource-constrained firms may suffer credit rationing caused by information asymmetry when raising external finance on the capital market (Jaffee and Russell, 1976; Stiglitz and Weiss, 1981, 1983; Myers and Majluf, 1984; Tang, 2009; Berger, Espinosa-Vega, Frame, and Miller, 2011), and (2) there exists substantial cross-country heterogeneity in the level of financial development (Beck, Demirgüç-Kunt, and Levine, 2000; Beck and Demirgüç-Kunt, 2009). Our purpose in the present study is to conduct a full investigation of cross-border asset sales with a focus on the roles of financial development and of its interaction with the exchange rate.

We first propose a model to analyze how imperfect capital markets and exchange rates influence firms' cross-border asset transactions. We build on the source of information asymmetry (costly state verification) in Froot and Stein (1991), and expand their model by incorporating the type of credit constraint as demonstrated in Antràs and Caballero (2009) as a second source of information asymmetry, namely, the levels of the country-specific financial development of the target country and the acquirer country. Our model shows that when the credit-constrained entrepreneur bids for corporate assets worldwide with finance raised externally in the imperfect capital market, the degree of credit constraint of a country affects asset sales through two channels: First, it influences the maximum amount of loans that the entrepreneur can obtain from the creditor; second, it affects the cut-off amount of wealth below which the entrepreneur is credit-rationed. As a result, the degrees of informational imperfections on the capital markets of the target country and the acquirer country influence the entrepreneur's reservation bidding price,

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and Rousseau (2002); Schlingemann, Stulz, and Walkling (2004); Yang (2008); Warusawitharana (2008); Maksimovic, Phillips, and Yang (2010); Levine (2011). For cross-border asset sales, see Froot and Stein (1991); Borisova, John, and Salotti (2011).

and thus the odds that she wins the bid and the cross-border asset sales between this country pair.

The above two channels lead to two sets of predictions concerning the asset transactions worldwide. First, regarding the asset sales that occur in a given target country, if the financial system of this target country improves, then the domestic entrepreneurs have higher odds to win the bid, which implies that a larger proportion of the domestic entrepreneurs win the bids when we aggregate the domestic entrepreneurs' odds to the country level. As a result, the proportion of domestic deals (as the complement to the proportion of cross-border deals) in the total deals that occur in this target country increases. The second set of predictions concerns the asset transactions for a specific target-acquirer country pair. Specifically, all else being equal, if the financial system of the target country improves, on the asset transaction market of the target country, a lower proportion of foreign entrepreneurs from a specific acquirer country win the bids. But if the financial system of the acquirer country improves, then a higher proportion of foreign entrepreneurs from this acquirer country win the bids in the target country. Moreover, the sensitivity of the proportion of cross-border deals to the real exchange rates is reduced by the improvement of the financial system of the target country. The reason is as follows. The improvement of the financial system of the target country may reduce the wealth effects caused by the depreciation of the target country currency as the low degree of information asymmetry of the target country increases the ability of the entrepreneurs in the target country to obtain loans from the bank through the two previously-mentioned channels. As a result, the entrepreneurs in the target country can bid a higher price for the assets in the target country.[4]

To formally test the model's predictions, we design two experimental settings, namely, the *target*

[4]The financial system of the acquirer country may also have impact on the sensitivity of the proportion of cross-border asset sales to the exchange rate. However, given the complexity of the general equilibrium, this effect is not easily disentangled and we leave it for future research.

country experiment and the *target-acquirer* country pair experiment, to evaluate the above hypotheses. As the first step, based on the data available at Securities Data Corporation Platinum (SDC), we construct a sample of annual asset sales with transaction values greater than 1 million U.S. dollars over the period of 1985 to 2010 for 43 countries, and document some stylized facts about cross-border asset sales. In the second step, we propose three empirical tests to evaluate our hypotheses. The first is a panel test based on regressions of the annual domestic asset sales in each *target* country on country characteristics that measure the degree of financial development and currency depreciation (Test 1). The second is a panel test based on regressions of the annual data for each *target-acquirer* country pair to link our measures of country-pair cross-border asset sales to measures for the degrees of financial development of the target country and the acquirer country and the bilateral exchange rates (Test 2). The third test is also based on cross-border asset sales for each *target-acquirer* country pair, but it specifically evaluates the hypothesis regarding the effect of the target country financial development on the sensitivity of the country-pair cross-border deals to the real exchange rates (Test 3).

Our tests provide empirical evidence consistent with the theoretical framework. Regarding Test 1, the domestic deal ratio, measured as the proportion of domestic deals in the total transaction values of the deals that occurred in this target country, is positvely correlated with the degree of financial development of this target country, measured as the credit to the private sectors to the GDP ratio. The domestic deal ratio is negatively associated with the real exchange rate, measured by the changes in the value of the target country currency against the U.S. dollar.[5] Regarding Test 2, the cross-border pair ratio, measured by the proportion of deals from a specific

[5]In this test, we use the value of the U.S. dollar as a benchmark. Specifically, if one unit of the U.S. dollar can be converted into more units of the target country currency in the next period, then the target country currency depreciates against the U.S. dollar.

acquirer country in the total transaction values of the deals that occurred in a target country, is negatively correlated with the degree of financial development of the target country, but positively correlated with the degree of financial development of the acquirer country. The magnitudes are also economically large: If the domestic credit to private sector to GDP ratio of the target country (acquirer country) increases by one standard deviation, the proportion of asset sales from the acquirer country to the target country decreases (increases) by 0.27 (0.14) units of standard-deviation. The result also demonstrates that the cross-border pair ratio is positively associated with the depreciation of the target country's real exchange rate, which accords well with Froot and Stein (1991).[6]

Regarding Test 3, the effect of the target country financial development on the sensitivity of the country-pair cross-border deals to the real exchange rates is captured by the interaction term between the target country financial development and the bilateral exchange rate. We find that the cross-border pair ratio is negatively correlated with this interaction term, which implies that the sensitivity of the cross-border pair ratio to changes in the bilateral exchange rates is reduced by the improvement of the target country financial system.

We conduct a battery of robustness tests. First, we control for variations in institutional factors and economic development across countries, such as capital account openness, the logarithm (Log) of GDP per capita, and the GDP growth rate, which might otherwise obscure the analysis. In Tests 2 and 3, we also consider the common language and geographic distances for the target-acquirer country pair, which may measure the degree of information asymmetry between

[6]If one unit of the acquirer country currency can be converted into more units of the target country currency in the next period, then the target country currency depreciates against the acquirer country currency.

the target and the acquirer countries. Our results show that all the above associations of interest regarding the domestic deal ratio and the cross-border pair ratio are robust to these additional control variables. In addition, we examine the transactions that occurred between the member countries of the Euro Area as these countries have the same currency. The results show that the dummy variable *Euro* is statistically insignificant, which provides supportive evidence to the model's predictions as the effect of the real exchange rate would not emerge if the target country and the acquirer country use the same currency for transactions.[7]

As a second robustness test, we use the counts of asset sales to construct the domestic deal ratio and the cross-border pair ratio. The results are still consistent with the model's predictions. Finally, we use the credit by the banking sector to GDP ratio as an alternative measure for the degree of financial market development. The results are similar.

This paper contributes to the existing literature in four aspects. First, we advance the understanding of the effects of imperfect capital markets on corporate investment across countries in an international context. The existing research concerning the impact of information asymmetry on the credit market on firms' investment mainly focuses on firms' domestic investment. Some studies find that a firm's inability to access to bank credit has negative impact on firms' investment and growth (e.g., Stein, 2003; Campello, Graham, and Harvey, 2010; Rahaman, 2011). In a cross-country comparison framework, studies suggest that credit constraints influence the domestic investment across different industries and that financial

[7]The corporate tax rate may be an important factor influencing the firms' investment decisions. However, for the data available from University of Michigan tax database, there is no time variation in the data on the average total tax rate, and the top tax rate is only available for the year 2002. Therefore, we cannot investigate the impact of the corporate tax rate on firms' cross-border investment.

development can improve capital allocation efficiency (e.g., Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998; Wurgler, 2000; Beck, Demirgüç-Kunt, and Maksimovic, 2008; Morck, Yavuz, and Yeung, 2011).

Despite the importance of cross-border asset sales in corporate investment, limited research has been devoted to how imperfect capital markets affect firms' *cross-border* asset sales and thus bilateral asset sales at the country level. Froot and Stein (1991) show that when entrepreneurs use external finance from the capital market with informational imperfections to bid for assets, the wealth effects caused by the depreciation of the target country currency enable foreign entrepreneurs to bid a higher price for the target country assets, and thereby acquire more assets in the target country. This paper introduces country-specific credit constraints on a firm's maximum amount of borrowing, as a second source of capital market imperfection. This new theoretical framework enables us to conduct cross-country comparisons regarding the impact of financial development and exchange rates on cross-border asset sales. We document robust empirical findings that are consistent with the model's predictions. Therefore, this paper contributes to the literature by identifying the roles of financial development and its interaction with the exchange rate. Moreover, this paper emphasizes the influences of financial development on the supply of external finance by creditors, which is of particular interest in light of the subprime crisis and complements the existing research from the demand side of the credit market (borrowing firms).

Second, this paper provides unique evidence regarding the impact of financial development on the sensitivity of cross-border asset sales to exchange rates. The result shows that an additional unit of depreciation in the target country currency is associated with a lower increase in the cross-border pair ratio for a higher level of financial development in the target country. This result is of particular importance to macroeconomic policy as it suggests that the deep capital

market of a country (as the target country) can partly mitigate the risks of large capital inflows associated with a sizeable depreciation of the real exchange rates.

Third, we collect comprehensive bilateral data on asset sales, and focus on the cross-country comparison on cross-border investment. A large body of literature investigates the reasons for firms' participation in *domestic* asset transactions and the factors affecting firms' participation.[8] Regarding the credit constraint, in particular, Maksimovic, Phillips, and Yang (2010) find that when making asset transaction decisions, public firms with intermediate access to credit markets (public firms with BBB ratings and below based on S&P long-term debt ratings) are most affected by changes in market liquidity. In an international context, a few studies explore cross-country comparisons on *cross-border* investment. Froot and Stein (1991) examine the wealth effects due to the depreciation of the target country currency when entrepreneurs use external finance from the credit market with informational imperfections to bid for assets. Borisova, John, and Salotti (2011) study why asset sales to foreign buyers yield higher abnormal returns to the seller as compared with domestic sales. These two papers examine the scenario in which the U.S. is the only target country (the seller). In contrast, Antràs, Desai, and Foley (2009) focus on the U.S. firms' investment overseas and investigate how the quality of investor protections and the depth of capital markets influence the cross-border operational, financing, and investment decisions of firms. As a result, most of the empirical studies on asset sales only investigate domestic asset sales; or, cross-border asset sales with a specific country (usually the U.S.) as either the only acquirer country or the only target country.

[8]The reasons and factors can be demand shocks, cross-sectional differences in productivity, liquidity of the markets for corporate assets, changes in productivity, profitability and firm size, and the production costs of the target firm (e.g., Maksimovic and Phillips, 2001, 2002; Jovanovic and Rousseau, 2002; Schlingemann, Stulz, and Walkling, 2004; Yang, 2008; Warusawitharana, 2008; Levine, 2011).

In this paper, we first conduct an overview on domestic and cross-border asset sales regarding the cumulative counts and transaction values by country pair, by year, and by the industries. Corresponding to the model's predictions, we then investigate the effects of imperfect capital markets and the exchange rates on cross-border asset sales. Therefore, this paper extends the existing literature that exclusively focuses on just domestic asset sales or cross-border asset sales with a specific country (usually the U.S.) as either the only acquirer or target country. In addition, by including both the target country and the acquirer country characteristics in the regressions, we distinguish between two correlations: that of cross-border asset sales with the target-country characteristics; and that of cross-border asset sales with the acquirer-country characteristics. This approach complements the econometric specification that includes the differences between the target country variable and the acquirer country variable in the regression, which imposes the restriction that the target country variable and the acquirer country variable bear the coefficients with the same magnitude but with opposite signs (Rossi and Volpin, 2004; Erel, Liao, and Weisbach, 2011).

Finally, as cross-border asset sales are components of foreign direct investment (FDI), in a broader sense, this paper is also related to the relevant studies on FDI. Klein, Peek, and Rosengren (2002) find that financial difficulties at banks reduce the number of Japanese-initiated FDI projects into the U.S. Generally speaking, our results are consistent with their findings; in addition, we use a comprehensive country sample and obtain richer findings on the effects of the interaction of financial development and exchange rates. Walsh and Yu (2010) find that net FDI flows in the secondary sector are drawn into countries with depreciated real exchange rates and that greater financial depth of the host country only leads to more FDI in manufacturing sectors. Blonigen and Piger (2011) explicitly exclude the exchange rates in their analysis and their Bayesian statistical techniques provide little support to high inclusion probabilities of

host-country infrastructure (including credit markets) and host-country institutions. The above two studies analyze the aggregate FDI flows into a target country, while we focus on the flows between each country pair.

The remainder of this paper is organized as follows. Section 2.2 develops a theoretical model on asset sales, exchange rates, and imperfect capital markets, and derives the propositions as well as a series of testable hypotheses. The empirical analysis follows in Section 2.3, in which we describe the sample of asset sales, data sources, and variable construction. Section 2.4 presents the econometric models, the empirical tests, and main results corresponding to each testable hypothesis; robustness tests are also examined in this section. Section 2.5 concludes the paper. All the proofs are collected in the Appendix.

2.2 The Model and Testable Hypotheses

Consider an extension of the model in Froot and Stein (1991) with credit constraints. Specifically, we maintain all the assumptions in Froot and Stein (1991) and then expand their model by incorporating the type of credit constraint as demonstrated in Antràs and Caballero (2009). The credit constraint is country-specific and related to the country's financial development. The friction behind the credit constraint could be related to an *ex-post* moral hazard problem, to limited commitment, or to adverse selection.[9]

2.2.1 The Model

There are $N+1$ countries in the world. Consider a generic domestic country d and N foreign countries: $n=1,2,...,N$. In each country, a continuum $[0,1]$ of projects are initially held by

[9]Antràs and Caballero (2009) develop a microfoundation for the financial constraint in a model with limited commitment on the part of entrepreneurs in Appendix A.1 of their paper.

domestic entrepreneurs. In order to operate the project, entrepreneurs need to purchase it initially, that is, a cash-in-advance constraint is imposed, which, combined with information asymmetry, is the source of the wealth effects emphasized in our model. A large number of domestic and foreign entrepreneurs are bidding for a specific asset. The one with the highest reservation price wins the bid. Figure 2.1 illustrates this model economy for an arbitrary country pair.

Entrepreneurs use the project as collateral to obtain loans from creditors. Entrepreneurs can only be financed by the local banking sector (intermediaries) in their home countries. However, local banks can source money worldwide. Entrepreneurs use their own wealth and loans to finance the purchases of the asset and then start to manage the asset, which generates payoffs for the entrepreneur. The optimal financing contract between the entrepreneur and the creditor involves the amount of loan L and the required debt repayment D. We follow Froot and Stein (1991) in adopting the assumption of costly state verification: External creditors must pay cost c if they want to observe the profit generated from the asset. When the profit from the asset falls below D, the creditor pays the monitoring cost c, discovers the profit, and keeps all of it.

2.2.1.1 Investment Opportunities

There are two periods of time: $t=1$ and 2. All agents are risk neutral and they can allocate their wealth in period 1 across three types of investments.

There are two riskless bonds available to all agents. They can invest in bonds and obtain the risk-free rate. The domestic interest rate, r, denominated in the domestic currency, is in the interval $(0,1)$, and the foreign interest rate $r^* \in (0,1)$, is denominated in the foreign currency. The uncovered interest parity is

$$(1+r) = E_1\left[(1+r^*)\frac{e_2}{e_1}\right] = (1+r^*)\frac{E_1(e_2)}{e_1}, \tag{2.1}$$

where e_1 and e_2 measure how many units of domestic currency one unit of foreign currency is

worth in period 1 and period 2, respectively.

To simplify the notation, we assume that $E_1(e_2)=1$ and that $r^*=0$. Let $e_1=e$, then equation (2.1) delivers

$$1+r=\frac{1}{e}.$$

The third asset is a risky direct investment asset held by the domestic entrepreneur. There are a large number of risky assets, indexed by i, available to the entrepreneur. The ith asset can be managed either by a single domestic entrepreneur, who realizes a random profit of x_i^d in the domestic currency, or by a single foreign entrepreneur, whose profit in the domestic currency is x_i^f. x_i^d and x_i^f are uniformly distributed over the intervals $[0, X_i^d]$ and $[0, X_i^f]$, respectively. The population-wide distributions of abilities of domestic and foreign entrepreneurs are $G^d(X_i^d)$ and $G^f(X_i^f)$, respectively, where $G^d(\cdot)$ and $G^f(\cdot)$ stand for certain general forms of distributions.[10] For tractability, we assume that realizations of X_i^d and X_i^f are independent.

2.2.1.2 Creditor's Supply of Loan

Consider a generic asset in the domestic country. For simplicity, we further assume that x_i^d and x_i^f are uniformly distributed over the interval $[0, X]$, that is, we assume that the domestic and foreign entrepreneurs have identical expected gross profits. Recall that the optimal financing contract is defined by a loan amount L, and a required debt repayment D. If the payoff of the asset is greater than D, that is, if $x>D$, the creditor receives D; if $x<D$, the creditor pays monitoring cost c and keeps $x-c$. Therefore, for a given contracted D, the expected return to

[10]For tractability, in the proofs of the propositions, as detailed in the Appendix, we assume that X_i^d and X_i^f are uniformly distributed over the interval $[\underline{X}, \overline{X}]$.

the creditor is

$$R_D^L = D - \frac{D^2}{2X} - \frac{cD}{X}. \tag{2.2}$$

Given the expected payoff for the creditor R_D^L and the cost of the loan, the credit market equilibrium implies that the creditor's loan supply function is

$$L = \frac{-D^2 + 2(X-c)D}{2X(1+r)}, \text{ for } D \in [0, X-c]. \tag{2.3}$$

Without any further frictions on the capital market, the maximum amount of loan that the creditor lends to the entrepreneur is

$$L_{\max} = \frac{-(X-c)^2 + 2(X-c)(X-c)}{2X(1+r)} = \frac{(X-c)^2}{2X(1+r)}. \tag{2.4}$$

Following Antràs and Caballero (2009), we introduce the second source of capital market imperfection: the credit constraint, which is related to the financial development of a country. To be specific, the creditor can only lend a fraction θ of the maximum amount of loan, i.e., the creditor's maximum amount of loan is

$$L_{\max}^{\theta} = \theta L_{\max} = \theta \frac{(X-c)^2}{2X(1+r)}, \text{ where } 0 \le \theta \le 1. \tag{2.5}$$

Notice that in addition to monitoring cost c, parameter θ captures the credit constraint. Given that the entrepreneur uses the asset as collateral, in the case where $c > 0$ and $\theta = 1$, the creditor can lend the maximum amount of loan $L_{\max} = \frac{(X-c)^2}{2X(1+r)}$ to the entrepreneur, as shown in (2.4), and requires debt repayment $D = X - c$ from the entrepreneur. However, if $c > 0$ and $0 \le \theta < 1$, the credit constraint, characterized by θ, further decreases the maximum amount of loan that the creditor would like to lend to the entrepreneur to $L_{\max}^{\theta} = \theta \frac{(X-c)^2}{2X(1+r)}$. Ideally, if the capital market is perfect in this economy, i.e., if $c = 0$ and $\theta = 1$, the maximum loan amount is $\frac{X}{2(1+r)}$, which is the expected value of the asset. However, for $c > 0$ and $0 \le \theta < 1$, the

entrepreneur cannot entirely finance the expected value of the asset with external loans.

Let $D^{\theta}_{\max}$ denote the amount of debt repayment corresponding to the maximum loan $L^{\theta}_{\max}$. Given the monotonicity of the loan supply function over the interval $[0, X-c]$, the loan supply function (2.3), together with the constrained maximum amount of loan (2.5), determines $D^{\theta}_{\max}$:

$$D^{\theta}_{\max} = (X-c)\left(1-\sqrt{1-\theta}\right). \tag{2.6}$$

Three features of equation (2.6) are worth noting. First, if $\theta = 1$, then $D^{\theta}_{\max} = (X-c)$, which is the case in Froot and Stein (1991). Second, $D^{\theta}_{\max}$ is increasing in θ for $\theta \in (0,1)$. This implies that as the information asymmetry becomes less severe in the capital market, the maximum amount of loans that the creditor would like to lend to the entrepreneur becomes greater, and the creditor requires a higher amount of debt repayment corresponding to the maximum loan $L^{\theta}_{\max}$. Third, if $\theta = 0$, then $D^{\theta}_{\max} = 0$, which implies that the information asymmetry on the capital market is so severe that no contract is reached between the creditor and the entrepreneur.

2.2.1.3 Entrepreneur's Reservation Price

Given the debt repayment D and the distribution of the profit X, the entrepreneur's expected returns from the management of the asset is

$$R^{E}_{D} = \frac{D^2}{2X} - D + \frac{X}{2}. \tag{2.7}$$

Now we characterize the equilibrium in the credit market. Due to the deadweight losses caused by monitoring cost c, the implicit interest rate for the entrepreneur to use loans is higher than r. Therefore, if the entrepreneur's initial wealth is sufficiently large, she will use it to fully finance the purchase of the asset instead of obtaining loans from the creditor. However, if the entrepreneur's initial wealth is not sufficiently large, she will partially finance the entire expected

value of the asset using external loans.[11] Thus, if $c > 0$ and $0 < \theta < 1$, depending the amount of the entrepreneur's initial wealth, three possible cases can occur in the equilibrium.

(i) *Case 1*: the entrepreneur's initial wealth is not sufficiently large so that she uses external funds to partially finance the purchase of the asset and she is credit-rationed. In the following analysis and Proposition 2.1, we also denote this case as Region 1 in terms of the amount of the entrepreneur's initial wealth.

(ii) *Case 2:* the entrepreneur's initial wealth is not sufficiently large so that she uses external funds to partially finance the purchase of the asset but she is not credit-rationed. Correpondingly, we denote this case as Region 2.

(iii) *Case 3:* the entrepreneur's initial wealth is sufficiently large so that she completely uses her initial wealth to finance the purchase of the asset. We denote this case as Region 3.

In what follows, we focus on the discussion of Case 2 as it is the general scenario. We summarize the main results in the main text and collect all the derivations in the Appendix.

Case 2

In this case, the entrepreneur uses the loan L and the initial wealth w to finance the payment. Given the perfect competition on the asset market, the entrepreneurs compete for a specific asset so that they bid up to the reservation price of the asset $P = w + L$, and each entrepreneur's

[11]The cut-off point of the wealth that determines whether the entrepreneur can fully cover the purchase of the asset only using her initial wealth is $w = \frac{X}{2(1+r)}$, which is exactly the present value of the asset. This is determined by the equilibria in the credit market and in the asset market, which are detailed below.

expected returns from the asset also equal the returns of her initial wealth from the alternative investment opportunities, i.e., the returns obtained in period 2 from investing her wealth in the riskless bonds in period 1: $(1+r)w$.[12] Therefore, the bidding rule of the entrepreneur is characterized by $R_D^E = (1+r)w$, and the maximum amount of the loan that the entrepreneur is willing to borrow is also determined by this condition.[13] Given the perfect competition on the credit market, the creditor's expected returns on the loan need to equal the returns on investing the amount of loan L in riskless bonds; therefore, the lending rule for the creditor is $R_D^L = D - \frac{D^2}{2X} - \frac{cD}{X} = (1+r)L$.

To summarize, in this case, the equilibria in the asset market and the credit market are characterized by the following conditions:

$$R_D^E = \frac{D^2}{2X} - D + \frac{X}{2} = (1+r)w, \tag{2.8}$$

$$R_D^L = D - \frac{D^2}{2X} - \frac{cD}{X} = (1+r)L. \tag{2.9}$$

$$P = w + L. \tag{2.10}$$

Using equations (2.8), (2.9), and (2.10), we fully characterize the reservation price using all the exogenous parameters:

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[12]For each asset, there are $N+1$ types of entrepreneurs: the domestic entrepreneurs and N types of foreign entrepreneurs. And there are a large number of entrepreneurs within the same type.

[13]Note that $R_D^E = \frac{D^2}{2X} - D + \frac{X}{2} = \frac{1}{2X}(X-D)^2$ is decreasing in D and is one-to-one. So controlling D is equivalent to controlling R_D^E. Also recall that the amount of loan is $L = \frac{-D^2+2(X-c)D}{2X(1+r)}$, which is increasing in D over the interval $[0, X-c]$. So controlling L is equivalent to controlling D. That is, a high R_D^E means a low D, and a low amount of loan L, thereby leading to a low amount of maximum controllable money for bidding: $L+w$.

$$P = \frac{1}{(1+r)}\left[\frac{X}{2} - c\left(1 - \sqrt{2w(1+r)/X}\right)\right]. \quad (2.11)$$

Case 3

In this case, the entrepreneur's initial wealth is sufficiently large so that she uses it to completely finance the purchase of the asset and bid at the expected present value of the asset. Thus, the reservation price is determined by the expected present value of the asset: $P = \frac{X}{2(1+r)}$; and the cut-off level of the wealth separating Case 2 from Case 3 is $w = \frac{X}{2(1+r)}$, which is exactly the expected present value of the asset.

Case 1

In this case, the entrepreneur's initial wealth is very low and she is credit-rationed. The reservation price is determined by the sum of the maximum amount of loan obtained from the creditor and her initial wealth: $P = \theta\frac{(X-c)^2}{2X(1+r)} + w$. The cut-off level of wealth separating Case 1 from Case 2, i.e., the entrepreneur's initial wealth below which she is credit-rationed is

$$w = \frac{\left[c + (X-c)\sqrt{1-\theta}\right]^2}{2X(1+r)}. \quad (2.12)$$

Three features of equation (2.12) are worth noting. First, if $\theta = 1$, then it is simplified to $w = \frac{c^2}{2X(1+r)}$, which is the original cut-off point for Regions 1 and 2 in Froot and Stein (1991). Second, the expression $\frac{\left[c+(X-c)\sqrt{1-\theta}\right]^2}{2X(1+r)}$ is decreasing in θ. As θ decreases, i.e., the degree of capital market imperfection increases, the cut-off point moves to the right thereby leading the credit-rationed region (Region 1) to expand and the non-rationed region (Region 2) to shrink. Third, if $\theta = 0$, then $w = \frac{X}{2(1+r)}$, which is essentially the cut-off point between Regions 2 and 3, in other words, in this extreme case, since the entrepreneur cannot obtain external finance at all, Region 2 completely disappears.

Overall, the entrepreneur's reservation bid price is summarized in the following proposition:

Proposition 2.1 *An entrepreneur with initial wealth* w *and ability* X *from a country with a degree of financial development* θ *has the following reservation bid price:*

$$P(\theta, X, w, c, r) = \begin{cases} \theta L_{\max} + w = \theta \frac{(X-c)^2}{2X(1+r)} + w, & \text{if } w \le \frac{\left[c+(X-c)\sqrt{1-\theta}\right]^2}{2X(1+r)} \text{ (Region 1);} \\ \frac{1}{1+r}\left[\frac{X}{2} - c\left(1-\sqrt{\frac{2w(1+r)}{X}}\right)\right], & \text{if } \frac{\left[c+(X-c)\sqrt{1-\theta}\right]^2}{2X(1+r)} < w < \frac{X}{2(1+r)} \text{ (Region 2);} \\ \frac{X}{2(1+r)}, & \text{if } w \ge \frac{X}{2(1+r)} \text{ (Region 3).} \end{cases}$$

Proposition 2.1 shows how the amount of the entrepreneur's initial wealth affects her reservation price. When her wealth is low (Region 1), the entrepreneur would like to bid up to the sum of the maximum amount of loan obtained from the creditor and her initial wealth: $\theta \frac{(X-c)^2}{2X(1+r)} + w$, and in this scenario, her marginal return is greater than $1+r$ and she is credit-rationed. Only when her wealth increases and reaches Region 2, the entrepreneur would like to bid up to $\frac{1}{1+r}\left[\frac{X}{2} - c\left(1-\sqrt{2w(1+r)/X}\right)\right]$. When the entrepreneur's initial wealth is sufficiently large (Region 3), the entrepreneur only uses her own initial wealth to pay for the asset and would like to bid the expected present value of the asset.

Proposition 2.1 also demonstrates how the credit constraint θ influences the comparative statics of the reservation price. Suppose that $\theta = 0$, i.e., the entrepreneur cannot obtain any loans from the creditor. This implies that the entrepreneur uses her initial wealth to completely finance the purchase of the asset. As shown by Proposition 2.1, in this scenario, Region 2 disappears, and only Regions 1 and 3 are left. In Region 1, the entrepreneur's wealth is very limited; therefore, the reservation price is simply w; while in Region 3 where her wealth is sufficiently large and is greater than the expected present value of the asset, the reservation price is exactly the present value of the asset. If $\theta = 1$, that is, there is no credit constraint in this economy, the pricing function $P(\theta, X, w, c, r)$ is the case in Froot and Stein (1991).

Suppose that $0 < \theta < 1$, which is the general scenario. In Region 1, $\frac{\partial P(\theta, X, w, c, r)}{\partial \theta} > 0$; as the

pricing function $P(\theta, X, w, c, r)$ is continuous in w over the whole domain of w, $\frac{\partial P(\theta, X, w, c, r)}{\partial \theta} > 0$ over the whole domain of w. Also the cut-off wealth which distinguishes Region 1 from Region 2 moves continuously to the left as θ increases. These two properties imply that values of $P(\theta, X, w, c, r)$ in Region 2 are greater than those in Region 1; in other words, entrepreneurs with greater initial wealth can bid a higher price.

To intuitively illustrate how the credit constraint affects the entrepreneur's reservation price, in Figure 2.2, we plot the reservation price $P(\theta, X, w, c, r)$ against wealth w for two economies: θ_{low}-economy (solid blue line) and θ_{high}-economy (dashed red line) which represent a severely-credit-constrained economy and a modestly-credit-constrained economy, respectively.[14] The intersections of these two lines with the vertical axis represent the maximum amount of loans that the creditor can lend to the entrepreneur in these two economies: $L_{\max}^{\theta_{low}}$ and $L_{\max}^{\theta_{high}}$. Clearly, $L_{\max}^{\theta_{high}}$ is greater than $L_{\max}^{\theta_{low}}$. In the θ_{high}-economy, as the dashed red line shows, when the entrepreneur is credit-rationed, she borrows the maximum amount of loan, and her reservation price increases one-for-one with her initial wealth. The same scenario occurs in the θ_{low}-economy.

In the θ_{high}-economy, the entrepreneur's wealth first reaches the cut-off amount above which she is not credit-rationed, which shows that Region 1 is smaller in the θ_{high}-economy compared with that in the θ_{low}-economy. In both economies, when the entrepreneur's wealth is beyond the corresponding credit-rationed cut-off level, the reservation price is still increasing in her wealth, but at a slower rate. Finally, when the entrepreneur's wealth is sufficiently large, she will only

[14]The parameter values are set as follows: $X = 10$; $c = 1$; $r = 0.10$; $\theta_{low} = 0.20$; $\theta_{high} = 0.80$; and w is in the interval $\left[0, \frac{1.2X}{2(1+r)}\right]$. These parameter values are chosen for the purpose to illustrate the intuition and are surely debatable.

use her wealth to pay for the price of the asset which is the expected present value of the asset; as a result, although the entrepreneur's wealth continues to increase, her reservation price remains unchanged. Because the cut-off level of wealth separating Region 2 from Region 3 does not depend on the degree of credit constraint, they are the same in these two economies.

The effect of the exchange rate on cross-border asset sales is as follows. Suppose that the domestic currency depreciates (e rises). This implies that the wealth of foreign entrepreneurs rises relative to that of domestic entrepreneurs. As the bidding price is an increasing function of the wealth, the wealth effect due to the depreciation of the domestic currency enables foreign entrepreneurs to bid a higher price so that they have higher odds to win the bid and acquire more domestic assets.

To summarize, our model shows that when the credit-constrained entrepreneur bids the corporate assets worldwide with finance raised externally on the imperfect capital market, the degree of credit constraint of a country affects the entrepreneur's odds to win the bid through two channels: (1) the maximum amount of loans that the entrepreneur can obtain from the creditor; and (2) the cut-off amount of wealth below which the entrepreneur is credit rationed. Therefore, the degrees of the capital market imperfection of the target country and the acquirer country influence the entrepreneur's reservation bidding price and thereby the odds that the entrepreneur wins the bid.

2.2.2 Testable Hypotheses

In this section, we derive additional propositions and develop the corresponding hypotheses for our empirical tests. All the proofs are given in the Appendix.

Assume that all countries have the same monitoring cost c and the same distribution of X, but the degree of credit constraint θ is different across countries. For tractability, without loss

of generality, we further assume that X is uniformly distributed over the interval $\left[\underline{X}, \overline{X}\right]$, that is, the probability density function (pdf) of X is $g(X) = \frac{1}{\overline{X} - \underline{X}}$. We consider a generic asset a on the asset sales market in country d.

First, we investigate the asset sales in each target country. Let dom_a denote the proportion of domestic deals in the total number of deals that occur in country d, and θ^d denote the degree of credit constraint in country d. We thus have the following proposition.

Proposition 2.2 *The proportion of domestic deals in the total number of deals that occur in country d is increasing in the degree of credit constraint in country d, that is,* $\frac{\partial dom_a}{\partial \theta^d} > 0$.

The mechanism behind this proposition is that the credit constraint of the target country affects the proportion of domestic entrepreneurs winning the bid and thus the proportion of domestic deals in the total number of deals that occur in this target country. So we have the following hypothesis concerning the proportion of domestic deals in a target country, which is the complement of the proportion of the cross-border deals. In Section 2.4, we use Test 1 to examine this hypothesis.

Hypothesis 2.1 *If the financial system in the target country improves, a larger proportion of domestic entrepreneurs win the bid, and the proportion of domestic deals in the total deals that occur in this target country increases.*

Next, we analyze how the degrees of the credit constraint of the target country and the acquirer country affect the bilateral deals for a target-acquirer country pair, i.e., the proportion of cross-border deals from a specific acquirer country in the total deals that occur in the target country. Let num_a^n denote the proportion of deals with acquirer country n in the total number

of deals that occur in target country d , and θ^n denote the degree of credit constraint in country n. We have the following proposition.

Proposition 2.3 *The proportion of deals with acquirer country n in the total number of deals that occur in target country d is decreasing in the degree of credit constraint in country d, but increasing in the degree of credit constraint in country n. That is,* $\frac{\partial num_a^n}{\partial \theta^d} < 0$; $\frac{\partial num_a^n}{\partial \theta^n} > 0$.

Accordingly, we present the following Hypothesis 2.2, and in Section 2.4, we design Test 2 to investigate it.

Hypothesis 2.2 *On the asset transaction market in country d, all else being equal, if the financial system of target country d improves, a lower proportion of foreign entrepreneurs from country n win the bid. In contrast, if the financial system of country n improves, a higher proportion of foreign entrepreneurs from country n win the bid in country d.*

Finally, we explore the impact of the exchange rates and its interaction with financial development. e^n denotes the exchange rate between the target country and the acquirer country, specifically, e^n is defined as the value of the acquirer country currency measured in units of the target country currency. The effect of the exchange rate on the asset sales for a target-acquirer country pair and the effect of the target country's financial development on the association between the asset sales and the exchange rate are summarized in Proposition 2.4 below.[15]

[15]The financial system of the acquirer country also has impact on the sensitivity of the proportion of cross-border deals to the real exchange rates. However, given the complex nature of the equilibrium, this effect cannot be solved explicitly. As numerical analysis is needed, we leave it for future research.

Proposition 2.4 *The proportion of deals with acquirer country n in the total number of deals that occur in target country d is increasing in e^n, that is, $\frac{\partial num_d^n}{\partial e^n} > 0$; however, this derivative is decreasing in the degree of financial development of the target country θ^d, that is, $\frac{\partial^2 num_d^n}{\partial e^n \partial \theta^d} < 0$.*

Correspondingly, Hypothesis 2.3 follows. In Section 2.4, we design Test 3 to test this hypothesis.

Hypothesis 2.3 *On the asset transaction market of country d, all else being equal, if the target country currency depreciates against the acquirer country, the proportion of deals from acquirer country n in the total number of deals that occur in country d increases. In addition, the degree of the financial development of target country d reduces the association between the proportion of deals from acquirer country n and the exchange rate.*

The depreciation of the target country currency has wealth effects; in other words, the entrepreneurs in the acquirer country can bid for a higher price due to their increased wealth. This channel is similar to that in Froot and Stein (1991). In addition, the different degrees of credit constraint in the target and acquirer countries, which are unique in our paper, interact with the impact of the exchange rate. Specifically, a better financial system in the target country partially offsets the impact of the depreciation of the target country currency.

2.3 Data and Variables

In this section, we describe our data sources, the screening procedures, and the variables that we construct to test our hypotheses.

2.3.1 Data and Sample

Regarding the country sample, we construct a bilateral data matrix of 43 source countries and 43 target countries. These countries are listed in Table 2.A.4.

Regarding the data screening criteria, we try to balance the accuracy and the maximum availability of asset sales deals. We impose certain searching criteria on the mergers and acquisitions (M&As) database recorded by SDC to identify cross-border asset sales. Borisova, John, and Salotti (2011) use Thomson ONE Banker's Deals Analysis module to identify cross-border asset sales, which has the same data coverage as SDC.[16] Warusawitharana (2008) also uses SDC to collect the data on asset sales when studying the domestic deals. We highlight some searching criteria here and the complete set of criteria is detailed in Table 2.A.3. Consistent with Borisova, John, and Salotti (2011), we only include acquisition of assets and acquisition of certain assets as the Form of the Deal, and the deal attitude is friendly. Regarding the "Consideration Sought Category", we only include "Assets". Regarding the "Acquisition Techniques", we only include "Divestiture" as classified by SDC. As to the cross-border asset sales, after the deal is identified by the cross-border deal flag of SDC, we further impose the restriction that the deal involves the acquirer and the target firms which are not located in the same nation. In addition, deals in which the target or the acquirer is a government agency are excluded from the sample.[17] We also exclude asset sales due to bankruptcy as reasons for the asset sales in this scenario are different from those of firms in good standing (Ofek, 1993). We further exclude deals involving financial industries (Standard Industrial Classification (SIC) codes 6000-6799) or utilities industries (SIC codes 4900-4999). The total number of asset sales over the period from 1985 to 2010 is 23,936 , and the count of cross-border deals is 6,491, while the domestic sample includes 17,445 deals.

As a first step, we present overviews of the counts and transaction values of the asset sales

[16]SDC and Thomson ONE Banker both belong to Thomson Financials Corporation.
[17]Karolyi and Liao (2010) investigate the cross-border acquisitions led by government-controlled acquirers from 1990 to 2008 using the corporate-led acquisitions as a benchmark.

aumulated over the whole sample period from 1985 to 2010 for each target-acquirer country pair. They are shown in Tables 2.1 and 2.2. In Table 2.1, each row represents an acquirer country (the buyer) while each column represents a target country (the seller). Therefore, the diagonal entries of the matrix are the cumulative counts of domestic asset sales for a particular country and the off-diagonal entries are those of cross-border asset sales involving firms from a particular pair of countries. There are a large number of country pairs without any asset sales. Intuitively, the reason for this may be that the fixed transaction cost, such as political risks and government regulations, is so high for this country pair that it prohibits any transactions between them. The country with the largest counts of deals is the U.S. Similar patterns emerge when we examine the cumulated transaction values, as shown in Table 2.2.

Table 2.3 reports the counts and transaction values by year for both the cross-border asset sales and domestic ones. Although the counts and transaction values fluctuate from year to year due to the influence of business cycles, the counts and transaction values of cross-border asset sales have increased over the past two decades. We also break down total asset sales into two-digit SIC macro-industries. Table 2.4 presents the distribution of counts by industries. As the table shows, regarding the cross-border deals, the target and acquirer firms display similar distribution of industries, and there is substantial cross-sectional variation across industries. Moreover, the data display a clear-cut concentration of transactions in manufacturing and service industries. As to the domestic deals, the same characteristics of the industry distribution emerge, although the fraction of manufacturing is much lower while those of the service and transportation industries are higher.

2.3.2 Variable Construction

In this section, we outline the variables that we use to evaluate the testable hypotheses developed in Section 2.2. The definitions and data sources of the variables are detailed in Table 2.A.1.

Regarding Hypothesis 2.1, we use the domestic asset sales ratio as the dependent variable, which is defined as the proportion of domestic deals in the total counts (or transaction values) of the deals that occurred in target country d (the seller). Regarding Hypotheses 2 and 3, we use the cross-border pair ratio as the dependent variable, which is measured as the proportion of cross-border asset sales involving target country d (the seller) and acquirer country n (the buyer) in the total counts (or transaction values) of deals that occurred in target country d.

The degree of the capital market development of a country is one of the key explanatory variables of interest. We use the domestic credit to private sector to GDP ratio as the primary measure. As an alternative measure, we also use the domestic credit provided by the banking sector to GDP ratio in the analysis.[18] Both of them are obtained from the World Development Indicators database (WDI) of the World Bank.

Another key explanatory variable is the exchange rate between the target country and the acquirer country, which is denoted by e^n in the model. We use the value of the acquirer country currency measured in units of the target country currency to measure it. If e^n goes up, then the target country currency depreciates against the acquirer country currency. In the regressions, we use the changes in the exchange rates.

We control for several measures of economic and institutional development that might otherwise obscure our analysis, as the above measures of the capital market development are correlated with these factors and these factors may have independent impact on asset sales. Specifically, to capture the degree of the capital account openness, we include the Chinn-Ito Index. We also

[18]These two measures objectively capture the lenders' willingness to supply loans and closely correspond to the degree of credit constraint in the theoretical model.

include the Log of GDP per capita, which is Purchasing Power Parity (PPP) adjusted in constant 2005 international dollars, and the GDP per capita annual growth rate. We also include the freedom scores of both the target country and the acquirer country in the regressions to control for the impact of institutional quality. In addition, we consider the language and geographic distances between the target-acquirer country pair, which are measures for the information asymmetry at the country level.

We also use a dummy variable, $Euro$, which is equal to 1 if both the target country and the acquirer country are in the Euro Area in year t and 0 otherwise, to control for the impact of adopting the euro on asset sales. The introduction of the euro may facilitate the movement of capital by boosting financial integration in the Euro Area. However, the common currency among the Euro Area countries eliminates the wealth effects of the exchange rates on cross-border asset sales. Therefore, the expected sign for the coefficient on $Euro$ is ambiguous.

2.4 Empirical Results

In this section, we map the theoretical results into empirical strategies and test the model's predictions.

The model's predictions motivate us to include both the target country and the acquirer country characteristics in the regressions. The target country variables control for characteristics that explain why some countries are more attractive than others to all acquirer countries; in contrast, the acquirer country variables control for features that explain why some countries are more likely to facilitate their entrepreneurs to win the bids than other countries. The variables that vary across country pairs can help explain why the same target country attracts different levels of asset sales from different acquirer countries. We include year dummies in the regression and use the clustered standard errors by target-acquirer country pairs. The year fixed effects, which help

control for the influence of specific events that are likely to be specific to particular country pairs at particular points in time, such as a currency crisis, a banking crisis, and a country's liberalization of its financial system. Clustering by country pairs is designed to obtain the unbiased estimation of standard errors.[19] The changes in exchange rates are lagged by one panel year to mitigate the effect of endogeneity. To mitigate the effects of outliers, we winsorize the variables at the 1st and 99th percentiles.

2.4.1 Domestic Deal Ratio: Test 1

In order to investigate the effects of financial development on the domestic deal ratio, as illustrated in Hypothesis 2.1, we design Test 1 as the following regression:

$$Y_{jt}^{d} = \alpha^{d} + \gamma^{d} RER_{j,t-1} + \kappa^{d} F_{jt} + \phi^{d} Z_{jt} + f_{t} + u_{jt}^{d}, \tag{2.13}$$

where Y_{jt}^{d} is the domestic deal ratio, $RER_{j,t-1}$ is the changes in real exchanges rates in period $t-1$, F_{jt} is the financial development of target country j, Z_{jt} is a vector of additional control variables that may be correlated with the cross-border asset sales, f_t stands for the year fixed effects, and u_{jt}^{d} is the idiosyncratic term. The model predicts κ^{d} to be positive.

The results are reported in Table 2.5 in which the domestic deal ratio is calculated in terms of transaction values of asset sales. As shown in column (1), the coefficient on the financial development of the target country is positive and statistically significant. Regarding the economic magnitude, if the domestic credit to private sector to GDP ratio of the target country increases by one standard deviation, the domestic deal ratio of the target country increases by

[19]This methodology is proposed by Petersen (2009). Clustering by two dimensions produces less biased standard errors. However, clustering by cross-sectional units and time does not always yield unbiased estimates. As the number of clusters---cross-sectional units or years---declines, the standard errors clustered by cross-sectional units and time are biased, although the magnitude of the bias is not large. When there are only a few clusters in one dimension, clustering by the more frequent cluster yields results that are almost identical to clustering by both cross-sectional units and time. In this specific setting, I have around 1000 country pairs and at most 26 years (varying depending on the explanatory variables); therefore, I cluster by country pairs.

0.23 units of standard-deviation.[20] The coefficient on the capital account openness is negative and statistically significant, which suggests that if the target country is more open, more cross-border deals occur in the target country, thereby leading to a lower proportion of domestic deals. After we control for Log GDP per capita and GDP per capita growth rate in column (2), the magnitude of the financial development of the target country only slightly changes. In column (3), we include an additional control variable: the institutional quality, the result is reassuringly similar.

2.4.2 Cross-border Pair Ratio: Test 2

In order to investigate Hypothesis 2.2 concerning the effects of financial development and the changes in real exchange rates on the cross-border pair ratio, we design Test 2; specifically, we estimate the following regression model:

$$Y_{ijt} = \alpha + \gamma RER_{ij,t-1} + \kappa_1 F_{it} + \kappa_2 F_{jt} + \phi Z_{ijt} + f_t + u_{ijt}, \quad (2.14)$$

where Y_{ijt} is the cross-border pair ratio, $RER_{ij,t-1}$ is the changes in real exchange rates in period $t-1$, F_{it} and F_{jt} are the degrees of financial development of the acquirer country and the target country, Z_{ijt} is a vector of additional control variables that may be correlated with the cross-border asset sales, f_t stands for the year fixed effects, and u_{ijt} is the idiosyncratic term. We expect γ and κ_1 to be positive, and, in contrast, κ_2 to be negative.

Table 2.6 reports the results regarding the cross-border pair ratio. The coefficient estimates provide strong support for the model's predictions. All the coefficients on the changes in the real exchange rates have the expected signs, although corresponding coefficients in columns (4) and

[20]The standard deviations of the domestic credit to private sector to GDP ratio of the target country and the domestic deal ratio of the target country are 48.9682 and 35.7921, respectively. Therefore, the effect of F_{jt} on Y_{jt}^d is $0.1650 \times 48.9682 / 35.7921 = 0.2257$.

(5) are statistically insignificant. All the coefficients on the domestic credit to private sector to GDP ratios of the target country and the acquirer country have the expected signs and are statistically significant.

To assess the magnitude of these effects, we compute the units of standard-deviation changes in the cross-border pair ratio associated with a one-standard-deviation change in the explanatory variables of interest. Regarding the changes in the real exchange rates, as shown in column (1), if the currency of the target country depreciates by one standard deviation, the proportion of asset sales between the acquirer country and the target country increases by 0.13 units of standard deviation.[21] Regarding the domestic credit to private sector to GDP ratio of the acquirer country, a one-standard-deviation increase in this variable is associated with 0.14 units of standard-deviation increases in the proportion of asset sales between the acquirer country and the target country.[22] In contrast, if the domestic credit to private sector to GDP ratio of the target country increases by one standard deviation, the proportion of asset sales decreases by0.27 units of standard deviation.[23] Therefore, the effect of the target country's financial development is around twice that of the acquirer country's in absolute values. The coefficient on the common language dummy is statistically insignificant, while the coefficient on the geographic distance is negative and statistically significant.

In column (2), we include the Log GDP per capita and the GDP per capita growth rate for the acquirer country and the target country separately. Although the magnitudes of coefficients on the changes in the real exchange rates and the financial development of the acquirer and the

[21]The standard deviations of the changes in the real exchange rates and the cross-border pair ratio in transaction values are 0.2970 and 27.3115, respectively. Therefore, the effect of $RER_{ij,t-1}$ on Y_{ijt} is $12.1795 \times 0.2970 / 27.3115 = 0.1324$.

[22]The standard deviation of the domestic credit to private sector to GDP ratio of the acquirer country is 48.9452. Therefore, the effect of F_{it} on Y_{ijt} is $0.0775 \times 48.9452 / 27.3115 = 0.1389$.

[23]The effect of F_{jt} on Y_{ijt} is $-0.1513 \times 48.9452 / 27.3115 = -0.2711$.

target countries become weaker, they still bear the predicted signs and are statistically significant. The coefficient on the Log GDP per capita of the target country is negative and statistically significant, which suggests that the economic development of the target country may increase the likelihood that the domestic entrepreneurs win the bids, thereby reducing the odds of their foreign competitors.

As shown in column (3), two additional control variables are included in the regression, namely, the capital account openness of the acquirer country and the target country. The coefficients on these two variables are statistically insignificant. In column (4), we include the dummy variable, $Euro$. The coefficient on $Euro$ is statistically insignificant.[24] In column (5), we control for the institutional quality of the target and the acquirer countries. The coefficients on these two variables are statistically insignificant, which is consistent with the results in Daude and Fratzcher (2008).[25] Although the coefficient on the changes of real exchange rates is statistically insignificant and the magnitude is also reduced, the statistical significance and the magnitudes of the financial development of the target and the acquirer countries barely change.

2.4.3 Interaction of Financial Development and Real Exchange Rates: Test 3

In order to investigate the effects of financial development on the sensitivity of the cross-border

[24]Dvorak (2006) finds that the introduction of the Euro is associated with an increase in the growth rate of physical investment. Our result is not inconsistent with his because we focus on the bilateral cross-border investment flows while he examines the total investment of a country.
[25]Using FDI stocks in a cross-sectional analysis, Daude and Fratzcher (2008) find that the size of FDI that a country receives is insensitive to institutional factors, such as transparency, investor protection, the degree of corruption, and expropriation risk in host countries. Some studies on cross-border M&As, in particular, on announcement returns, suggest that corporate governance can be a motive for cross-border acquisitions, see, among others, Rossi and Volpin (2004); Bris and Cabolis (2008); Chari, Ouimet, and Tesar (2010); Ellis, Moeller, Schlingemann, and Stulz (2011).

pair to changes in real exchange rates, as suggested in Hypothesis 2.3, we design Test 3 and estimate the following regression:

$$Y_{ijt} = \alpha + \gamma RER_{ij,t-1} + \delta_n RER_{ij,t-1} \cdot F_{it} + \kappa_n F_{it} + \delta_d RER_{ij,t-1} \cdot F_{jt} + \kappa_d F_{jt} + \phi Z_{ijt} + f_t + u_{ijt}, \quad (2.15)$$

where Y_{ijt} is the cross-border pair ratio, $RER_{ij,t-1}$ is the changes in real exchange rates in period $t-1$, F_{it} and F_{jt} are the financial development of the acquirer country and the target country, Z_{ijt} is a vector of additional control variables that may be correlated with the cross-border asset sales, f_t stands for the year fixed effects, and u_{ijt} is the idiosyncratic term. Leaving the level terms F_{it} and F_{jt} out can result in the interaction terms being spuriously significant, so we also include the level terms in the regression.

We focus on the effect of target country financial development on the sensitivity of the cross-border pair ratio to changes in exchange rates, which is captured by the coefficient δ_d. In other words, the changes in real exchange rates may have different effects on the cross-border pair ratio for target countries with different levels of financial development F_{jt}. We are interested in the partial effect of changes in real exchange rates on the cross-border pair ratio, holding all other variables fixed:

$$\frac{\partial Y_{ijt}}{\partial RER_{ij,t-1}} = \gamma + \delta_n F_{it} + \delta_d F_{jt}.$$

As suggested by Hypothesis 2.3, $\delta_d < 0$, which implies that an additional unit of depreciation of the target country currency is associated with a lower increase in the cross-border pair ratio for a higher level of financial development in the target country. We evaluate this partial effect at the sample average of the financial development.

Table 2.7 reports the results regarding the effects of the financial development on the sensitivity of the cross-border pair ratio to the changes in real exchange rates. Similar to Table 2.6, the dependent variable is the cross-border pair ratio. Compared with column (1) in Table 2.6, column (1) in Table 2.7 includes two additional explanatory variables, i.e., the interaction term

between the changes in real exchange rates and the acquirer country financial development and that between the changes in real exchange rates and the target country financial development. The coefficient on the latter interaction term has the expected sign and is statistically significant. Moreover, other variables of interest bear the predicted signs and are statistically significant.

To gauge the magnitude of the effect of depreciation of the real exchange rate of the target country currency on the cross-border pair ratio, we compute the units of standard-deviation changes in the cross-border asset sales ratio implied by a one-standard-deviation change in the changes in real exchange rates. Column (1) shows that, evaluated at the sample average of financial development of the acquirer country and the target country, if the currency of the target country depreciates by one standard deviation, the proportion of asset sales from the acquirer country to the target country increases by 0.32 units of standard deviation.[26] If the financial development of the target country increases by one standard deviation, and if the currency of the target country depreciates by one standard deviation, the proportion of asset sales from the acquirer country to the target country only increases by 0.11 units of standard deviation.[27] Therefore, the improvement in the financial system of the target country can partially offset the effects of the depreciation of its currency on the cross-border capital flows, and the magnitude is economically large.

When we include other control variables in the regressions, as shown in columns (2) and (3), the

[26]The sample average of the acquirer country (or the target country) credit to private sectors to GDP ratio is 82.0818. Therefore, the partial effect of changes in real exchange rates on the cross-border pair ratio is
$[87.9210+(-0.3083)\times 82.0818+(-0.4011)\times 82.0818]\times 0.2970/27.3115=0.3229$.

[27]The standard deviation of the target country credit to private sectors to GDP ratio is 48.9452. Therefore, the partial effect of changes in real exchange rates on the cross-border pair ratio is
$[87.9210+(-0.3083)\times 82.0818+(-0.4011)\times(82.0818+48.9452)]\times 0.2970/27.3115=0.1094$.

magnitudes of the coefficients barely change. As shown in column (4), the coefficient on the dummy variable $Euro$ is statistically insignificant. In column (5), we include the institutional quality of the target and the acquirer countries. Although the coefficient on the changes of real exchange rates is reduced, it is still statistically significant. The magnitudes of the coefficients on the variables of interest: the financial development of the target and the acquirer countries, and the interaction term between the changes in real exchange rates and the target country financial development, only slightly change.

2.4.4 Additional Robustness Tests

In order to investigate the robustness of the results, we conduct a series of additional tests. We use the counts of asset sales to construct the domestic deal ratio and the cross-border pair ratio, and conduct the same exercises as in Tables 2.5, 2.6, and 2.7.

Table 2.8 reports the results regarding the domestic deal ratio of the target country, i.e., Test 1. The dependent variable is the proportion of the counts of domestic asset sales in the total counts of deals that occurred in target country d. The results are still consistent with the model's predictions. Compared with the results in Table 2.5, Table 2.8 shows that the R^2s increase slightly if we use the counts of asset sales to construct the dependent variable.

Table 2.9 reports the results from Test 2: the cross-border pair ratio. The results provide support for Hypothesis 2.2. Table 2.10 presents the results from Test 3: the effects of the financial development on the sensitivity of the cross-border pair ratio to the changes in real exchange rates. The results are reassuringly similar to those in Table 2.7. We also notice that R^2s increase compared with those in the corresponding regressions in which transaction values are used to construct the dependent variables.

As another robustness test, we use the credit by the banking sector to GDP ratio as a measure for the financial development. In these regressions, we perform the tests using the dependent variables constructed from both counts and transaction values of asset sales. In order to save space, we only report the results when using the full set of explanatory variables in the regressions.[28] As shown in Tables 2.11, 2.12, and 2.13, all these empirical findings are consistent with the model's predictions. We also use the market capitalization to GDP ratio to measure the financial market development, and the coefficient estimates on the financial market development are statistically insignificant. The reason may be that the market capitalization to GDP ratio cannot fully capture the informational imperfections on the credit market. Another possible reason may be the high volatility of the equity markets.[29]

2.5 Concluding Remarks

We present a model to show how informational imperfections on the capital markets impact the asset sales worldwide. Specifically, the monitoring cost together with the country-specific credit constraint affects the maximum amount of loans that the entrepreneur obtains and the cutoff amount of wealth below which the entrepreneur is credit-rationed. We construct a comprehensive data set on cross-border asset sales, design relevant tests, and document robust empirical findings that are consistent with the model's predictions. Specifically, we find that the proportion of asset sales involving a specific acquirer country in the total cross-border asset sales that occurred in the target country is negatively correlated with the level of financial development of the target country, while it is positively associated with that of the acquirer country. We also present one unique empirical finding: The improvement of the target country's

[28]The rest of the results are available upon request.
[29]di Giovanni (2005) investigates the cross-border M&As over the period from 1990 to 1999. He finds that the size of the acquirer country's financial market, as measured by the stock market capitalization to GDP ratio, is positively associated with its firms' cross-border M&A activities.

financial system can reduce the impact of changes in real exchange rates on cross-border asset sales.

Our theoretical model and empirical findings advance the understanding of the cross-border asset sales for cross-country comparision, thereby complementing the current literature on domestic or cross-border asset sales to a single target country or by a single acquirer country. Our findings have rich policy implications. They highlight the important role and impact of capital markets on cross-border corporate investment. They also suggest that deep financial markets can partly mitigate one of the main risks associated with a sizeable depreciation of the real exchange rate: the large capital inflows due to a sizeable depreciation of the real exchange rate and the destabilization of the macroeconomy.

The findings of this paper point to new avenues for future research. First, as noticed above, there are substantial zero observations in cross-border asset sales for country pairs. Intuitively, the factors that might lead to these zero observations could be political risks, investment regulations and restrictions, transaction cost, and so on. These factors could act like certain types of fixed costs that are so high that they completely prevent entrepreneurs from participating in the foreign asset transaction markets. As the focus of this paper is the credit constraint and exchange rates, only conditional on the deal happens, can we examine their impact on cross-border deals. However, these types of fixed costs are of importance to the globally integrated corporate asset markets; thus, it could be worthwhile to study the impact of these types of fixed costs.

Second, as the credit constraint and exchange rates have impact on the odds that entrepreneurs win the bids, it could be worthwhile to incorporate these features into the model built by Hege, Lovo, Slovin, and Sushka (2009), and study whether and how the credit constraint and exchange rates affect the means of payment in cross-border asset sales. This exercise could also make rich

predictions regarding the gains to both buyers and sellers generated in cross-border asset sales by different means of payments, and thus empirical work along this line could also add new findings to the existing research.

Third, given the rich features of data on asset sales, it could be interesting to explore the cross-border asset sales at the industry level. As different industries have different degrees of dependence on external finance (Rajan and Zingales, 1998), one hypothesis could be that the association of the cross-border pair ratio with the degree of financial development is higher in industries that have a higher dependence on external finance. The challenge to this test is to construct appropriate measures for the industry-specific credit constraint. The findings regarding industry-specific credit constraint may help to explain the differences in industry distributions in cross-border and domestic asset sales, and it could also generate policy implications on the improvement of the financial system.

Finally, it could be interesting to study the abnormal returns of both the sellers and the buyers at the firm level upon the announcement of the asset sales for our comprehensive data set. Some interesting facts could emerge as there are large variations in country and firm characteristics across countries; therefore, the new findings could complement the results in Borisova, John, and Salotti (2011).

APPENDIX

Proof of Proposition 2.1

Case 2

As shown in the main text, in this case, the equilibria in the asset market and the credit market are characterized by equations (2.8), (2.9), and (2.10). Equations (2.8) and (2.9) deliver

$$R_D^E + R_D^L = \frac{X}{2} - \frac{cD}{X} = (1+r)(w+L).$$

Therefore, by equation (2.10), the reservation price is

$$P = w + L = \frac{1}{(1+r)}\left(\frac{X}{2} - \frac{cD}{X}\right). \tag{2.16}$$

Using equation (2.8), we can solve for the repayment D

$$D = X\left[1 - \sqrt{2w(1+r)/X}\right]. \tag{2.17}$$

Substituting (2.17) into (2.18), we fully characterize the reservation price using all the exogenous parameters:

$$P = \frac{1}{(1+r)}\left[\frac{X}{2} - c\left(1 - \sqrt{2w(1+r)/X}\right)\right]. \tag{2.18}$$

Case 3 The term $c\left(1 - \sqrt{2w(1+r)/X}\right)$ in equation (2.11) captures the deadweight loss associated with monitoring cost c, and it is decreasing in w, which implies that the more initial wealth the entrepreneur has, the more benefit she preserves. Thus, in order to avoid the deadweight loss, the entrepreneur has an incentive to use his initial wealth when bidding for the asset. Therefore, in the case in which the entrepreneur's initial wealth is sufficiently large, she will completely use it to finance the purchase of the asset and bid at the expected present value of the asset, and the reservation price is determined by the expected present value of the asset:

$$P = \frac{X}{2(1+r)}. \tag{2.19}$$

The above analysis shows that the cut-off point of the wealth that determines whether the entrepreneur use external funds to finance the bidding for the asset is determined by the condition $\left(1 - \sqrt{2w(1+r)/X}\right) = 0$. Therefore, the cutoff point of the wealth separating Case 2

from Case 3 is $w = \frac{X}{2(1+r)}$, which is exactly the expected present value of the asset.

Case 1 Recall that under the two types of frictions of the imperfect capital market in this economy, i.e., the monitoring cost c and the credit constraint θ, as shown by equations (2.4) and (2.5), the maximum amount of loans that the creditor can lend to the entrepreneur is $\theta \frac{(X-c)^2}{2X(1+r)}$. Therefore, if the entrepreneur's initial wealth is sufficiently low, although her ability X may be high enough and she wants to obtain an amount of loan $L > \theta \frac{(X-c)^2}{2X(1+r)}$, the creditor is not able to lend the money to him. In this scenario, the entrepreneur is credit-rationed, and the expected returns generated from the management of the asset is greater than the returns of her initial wealth from its alternative investment opportunities, i.e., $\frac{D^2}{2X} - D + \frac{X}{2} > (1+r)w$. The reservation price is determined by the sum of the maximum amount of loan obtained from the creditor and her initial wealth:

$$P = \theta \frac{(X-c)^2}{2X(1+r)} + w. \tag{2.20}$$

Next, we derive the cut-off point of wealth separating Case 1 from Case 2. Recall that when the repayment D is less than the amount of repayment corresponding to the maximum loan $L_{\max}^{\theta}$, i.e., when $D < D_{\max}^{\theta}$, the entrepreneur is not credit-rationed. Therefore, using equations (2.6) and (2.17), we can determine the cut-off point of wealth separating Case 1 from Case 2, i.e., the entrepreneur's initial wealth below which she is credit-rationed:

$$w = \frac{\left[c + (X-c)\sqrt{1-\theta}\right]^2}{2X(1+r)}. \tag{2.21}$$

Proofs of Propositions 2.2, 2.3, and 2.4 are available upon request.

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Figure 2.1
Model economy for an arbitrary country pair.
This figure illustrates the model economy for an arbitrary country pair. Country D and Country F stand for the domestic and the foreign country, respectively.

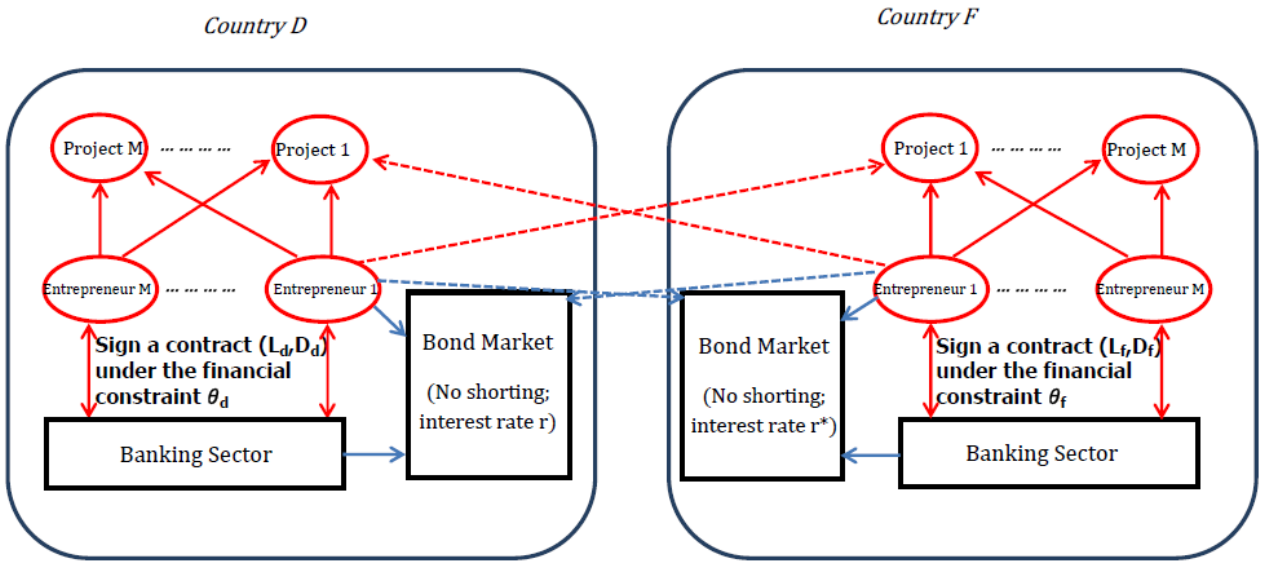

Figure 2.2

Effects of credit constraint: θ_{low} vs. θ_{high}.

This figure illustrates how the credit constraint affects the entrepreneur's reservation price. It plots the reservation price P(θ,X,w,c,r) against wealth w for two economies: θ_{low}-economy (solid blue line) and θ_{high}-economy (dashed red line) which represent a severely-credit-constrained economy and a modestly-credit-constrained economy, respectively. The price function P(θ,X,w,c,r) is shown in Proposition 1, and the parameter values are set as follows: $X = 10$; c=1; r=0.10; θ_{low} =0.20; θ_{high}=0.80; and w is in the interval [0, $\frac{1.2X}{2(1+r)}$]. These parameter values are chosen for the purpose to illustrate the intuition and are surely debatable.

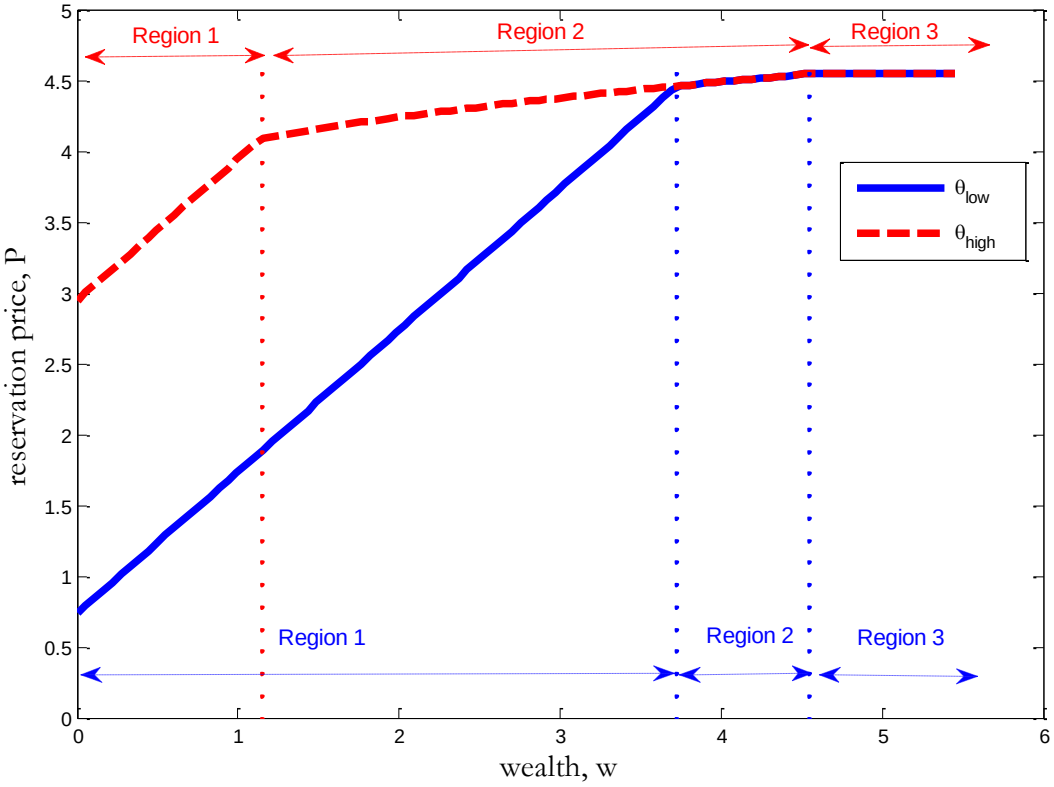

Table 2.1

Cumulated counts by country pairs.

This table presents the cumulative counts of asset sales for each target-acquirer country pair over the sample period from 1985 to 2010. Each row represents an acquirer country (buyer) while each column represents a target country (seller). Therefore, the diagonal entries of the matrix are the counts of domestic asset sales for a particular country and the off-diagonal entries are those of cross-border asset sales involving firms from a particular pair of countries. The country names are listed in Table 2.A.4.

	AR	AS	AU	BE	BR	CA	CE	CH	CO	CC	DN	FN	FR	WG	GR	HK	HU	ID	IN	IR	IS	IT	JP	SK	LX	MA	MX	NT	NZ	NO	PH	PL	PO	RU	SG	SA	SP	SW	SZ	TH	TK	UK	US
AR	21				3	1	1																																					
AS	2	900		1	3	14	2	3	1		1	3	4	7				1	5	1	1	4				1		4	36	1	1				6	6	2	3	1	1		20	71
AU	1		12		1	1				1	1	1	1	10						1		6					1	2				1				1	4	3			3	3
BE	1	2		21		2					2	2	9	11				1		1		2			1			7							1	2	3	2			20	22
BR	4				75	2			2				1	1								1				1	1		2								1				2	9
CA	9	20	1	2	15	860	2	4	5	2	2	2	4	6					1	1		3		2			28	5	4		1		1			3	4	3	2		1	49	340
CE	2				6		9		2																			1														1
CH		5		1		5	1	141	1				1			4			2					2				1	1					1	1						1	9
CO							1		6																																	2
CC										5																						1						1					
DN		2				2					37	2	4	6				1		1		2					8		5		1		1	1	1	1	11	4			18	14
FN		1	1	2	1	2					3	68	7	8		1		1				2				1	5		9		1		1				14	1			11	22
FR	1	5	1	5	9	5	1	1	1		5	1	217	23		1	1	5		1	1	11		4	1			15	1	5		4	1		1	3	13	9	8	1		81	89
WG		5	3	5	4	4	1	2		3	11	5	20	117				3	1		1	6		3	1	1		11		5		4			2	1	5	13	8		2	60	93
GR															18	1			1			1	2							2			1		1	1	1				1	3
HK		6			1	2		11			1		1	2		48						1				2	2		2		1			6			1		1		14	25
HU														1			4														1										1	
ID		6			2	2				2			4	6				99		1		1						1				1				1					12	32
IN						2										1			14														1								1
IR	1	4	2	1		3					2	2	3	3						60	1	1					1	5		1						1	2			63	38
IS		1		1		1							5	2							28	2		1							1						1	3			3	41
IT	1	3	3	4	3	1	1	2		3	1		20	12	2			1				160						3		1			1			1	9	3	4		1	22	30
JP		7	2	3	2	4		3			1	3	3	6		3			1			4	432				1	6	1	1				2	3	2	2	2	2	1		27	131
SK		1				1		2						2				1					1	91	1	1			1						1						2	16
LX				1							1		2				1	1			1						1	1		2			1			1	1	2	1			4	3
MA		5						1						1		1		1								46		2	2						2	1				2		1	5
MX					7		1		1																	1	35			2							1					17
NT		6	2	14	2	6		2	1	1	5	6	27	14	1	1	1	1	1			6			1		1	62	1	4		2		1	1		8	10	3			50	46
NZ		23				2																1					1	1	62												4	4
NO		1	1	2	1	2					9	2	2	4														4		92		1	1		2		2	26			17	18
PH																							1				1			1	11								1		1	1
PL										1							1															22										1	
PO					3								1	2																1			24				5				1	1	1
RU				1		1						1		2								1	1							1			25		1		1	1		1	1	2
SG		14		2	2	1		2			1		2	6		4					1	1		1		3	1	1	4		1				39	1		1	2	3		6	14
SA		13									1	1	1	2								1													136						11	5
SP	5				4	1	3	2	4	2		2	14	4			1					8	1		1		4	1				1	2				159	3	2			9	13
SW	1	5	2	6		7		1		1	26	19	18	19			2	1				6		2			1	9	1	20				2			3	106	3			49	45
SZ	1	10	3	3	2	6			3	1	2	2	13	13		1		1		1		7		1	1			6	1	2				1		3	3	5	23			14	53
TH		1														1										1			1						1					1	15		4	3
TK													1			1	1											1						1							13		1
UK	2	71	3	15	9	40	2	3		6	12	6	99	103		9	1	5	2	32	4	31	4	1	1	2	6	65	7	27	1	7	4	5	4	27	29	37	19	2	1	3080	583
US	21	100	7	17	34	304	9	23	3	1	17	17	102	156	1	9	3	22	4	16	25	25	18	19	1	5	43	68	6	30	4	4	1	7	10	9	24	39	27	1		501	9951

Table 2.2

Cumulated transaction values by country pairs.

This table presents the cumulative transaction values of asset sales for each target-acquirer country pair from 1985 to 2010. Each row and each column represent an acquirer country (buyer) and a target country (seller), respectively. The transaction values are adjusted by the GDP deflator of the U.S., available at the U.S. Bureau of the Economic Analysis (BEA). GDP deflator is equal to 1 in the year of 2005. The transaction values are in millions of U.S. dollars. The country names are listed in Table 2.A.4.

	AR	AS	AU	BE	BR	CA	CE	CH	CO	CC	DN	FN	FR	WG	GR	HK	HU	ID	IN	IR	IS	IT
AR	1266.26				393.41	9.92	1.87															
AS	45.12	39737.10		46.83	211.83	2001.22	25.66	28.28	6.89		1.75	130.15	1907.47	1988.71				6.52	439.33	8.11	2.95	1388.21
AU	5.52		543.16		79.49	583.86				12.35	62.44	120.03	65.01	1254.39						114.86		123.65
BE	6.88	352.67		886.81		524.91					76.27	19.83	233.94	997.18				24.46		2.36		93.17
BR	1442.61				7682.00	932.15			519.99				3.40	868.81								135.50
CA	159.90	727.32	2.63	46.64	908.21	62035.23	32.61	136.74	106.23	591.05	71.53	106.08	257.37	639.53					46.78	209.83		599.25
CE	233.87				2128.49		1153.54		144.61													
CH		1880.33		480.92		148.86	16.27	13767.71	823.19				12.50			153.54			926.95			
CO							197.56		829.71													
CC										50.13												
DN		112.40				823.07					1803.77	174.29	481.05	6022.03				6.16		64.32		12.39
FN		10.71	78.77	302.68	401.91	8.33					90.65	2340.16	1355.36	701.90		29.46		9.56				85.09
FR	37.99	101.00	136.01	818.63	999.90	678.81	747.31	152.81	460		1822.05	44.11	27173.78	9829.39		135.37	9.00	1247.12		81.33	4.70	839.11
WG		854.83	275.13	557.60	1586.93	2491.24	356.68	325.15		149.74	5081.43	460.17	4810.96	23958.96				173.42	10.86		27.62	365.60
GR															729.57	1.91			40.93			32.33
HK		307.43			9.65	46.66		38826.43			78.54		31.50	19.97		5940.06						175.67
HU														302.08			21.94					
ID		166.05			109.21	103.17				36.77			563.10	892.27				4032.46		493.41		99.41
IN						42.99										32.78			1500.60			
IR	20.85	86.24	59.94	19.86		65.51					49.01	555.32	309.29	295.31						3814.69	6.05	32.90
IS		10.37		34.29		16.42							669.40	4462.96							741.05	101.95
IT	21.05	78.05	63.42	946.97	164.83	162.47	180.74	69.23		30.36	749.58		1367.16	3482.13	4421.75			46.75				17758.37
JP		1665.32	254.90	357.50	24.74	131.74		680.46			20.10	343.45	272.18	220.74		1627.21			13.83			632.24
SK		6.36				302.94		38.88						73.10				42.12				
LX				22.59							204.37		520.99				18.44	8.42			155.09	
MA		194.14						48.08						67.73		35.06		9.63				
MX					859.99		505.08		20.78													
NT		401.81	99.95	4441.94	209.05	1170.68		15.69	735.27	236.53	111.54	963.83	4395.51	2794.10	138.50	183.45	6.35	2.64	49.60			601.50
NZ		3201.85				300.83																95.21
NO		5.34	453.93	58.74	4471.63	1467.42					675.30	23.26	49.85	3032.57								
PH																						
PL										252.62							32.98					
PO					400.16								136.79	192.79								
RU				16.69		3705.61						395.13		131.21								1931.46
SG		520.44		6.47	66.44	749.20		51.92			16.51		75.79	365.68		400.47					22.56	51.75
SA		2791.36									100.86	995.94	35.59	2813.90								50.11
SP	1618.36				556.07	40.07	1384.27	48.27	1364.48	61.98		43.44	2470.32	2686.97			1.80					1589.61
SW	14.46	481.29	309.47	430.80		1250.53		45.18		18.87	2555.69	2140.98	2786.73	1419.83			4.84	15.16				442.04
SZ	1.47	4531.89	1299.06	527.52	261.51	171.16			2532.35	7.03	580.43	98.02	1505.31	5970.89		35.58		6.91		3.51		3026.05
TH		3.42														85.15						
TK													10.51			4.61	50.19					
UK	542.46	7553.61	594.74	902.52	786.38	6767.70	1583.00	157.79		162.97	3576.71	837.12	12386.95	10161.08		632.15	1.00	218.03	110.74	3063.47	89.42	3547.04
US	2136.59	11691.34	1142.36	3048.62	4906.45	30143.84	148.40	2813.09	299.23	401.87	2833.72	2279.04	27785.79	41558.43	326.57	772.24	38.34	4343.22	87.11	820.80	1471.72	4744.48

Table 2.2 (continued)
Cumulated transaction values by country pairs.

	JP	SK	LX	MA	MX	NT	NZ	NO	PH	PL	PO	RU	SG	SA	SP	SW	SZ	TH	TK	UK	US
AR																					
AS				21.77		945.61	4051.26	690.03	2.81				252.69	371.42	81.90	403.80	32.97	10.33		5733.85	13379.88
AU					55.26	133.09				137.42					7.06	1324.05	731.23			297.47	350.18
BE			300.26			218.94								9.80	51.93	179.40	390.77			6919.31	2187.35
BR					3.25	40.24		25.13							97.57					114.96	2103.46
CA		29.74			766.69	644.34	1430.06		13.70		581.62			21.43	100.04	121.43	3337.14		72.05	7984.76	40395.25
CE						69.73															642.69
CH		573.99					8.32	112.90					1.60	6.12						6.46	747.10
CO																					428.45
CC										9.13						2.74					
DN						450.14		117.98		8.90		45.18	1.40	409.20	74.40	883.21	595.06			528.95	4965.23
FN					34.10	1927.36		873.99		27.61		9.53				903.20	90.92			750.83	3367.91
FR		401.30	123.20			4606.69	23.20	384.17		652.21	31.78		1.09	483.23	2642.26	823.54	692.55	28.94		19426.12	43131.23
WG		1147.18	70.63	29.33		3638.77		425.26		295.26			98.38	30.77	747.75	1917.86	5429.39		128.35	8688.69	46278.70
GR	60.58							59.26				220.63		8.46	5.93	15.68				15.63	948.46
HK				120.68	20.66		333.50		6.62				441.41			647.51		5.57		1354.01	4289.20
HU										13.73										112.23	
ID						282.60				35.54					18.59					874.67	1219.98
IN													30.54								16.42
IR					146.71	1451.54		6.28							12.60	100.68				3693.99	5774.01
IS		175.42								21.71						27.99	128.57			137.86	2397.28
IT						90.27		1170.23			55.67			9.03	301.26	465.14	235.74		133.81	1884.26	11646.69
JP	18819.34				281.70	10215.33	709.01	180.74				33.13	69.95	110.83	134.60	97.58	551.98	3.67		4658.16	30594.60
SK	15.26	9977.21	406.04	9.68			40.00						122.65							136.89	5269.17
LX					1394.58	18.75		41.01			40.57			1825.54	104.31	55.18	34.86			1216.98	1085.45
MA				1506.95		289.74	195.48						18.54	17.33				76.56		6.26	302.00
MX				2.35	5550.81			1061.95							12.29						5063.11
NT			1.22		6.27	8621.09	15.93	676.27		645.07		32.93	1402.56		528.21	2556.51	2325.23			6500.25	21225.19
NZ					30.75	141.79	2330.32													713.31	551.14
NO						1167.53		4891.95		13.94	48.37		391.22		759.50	1277.07				715.47	5350.44
PH	4.51				3.36			14.72	311.83									105.72		62.21	1.35
PL										698.16										103.20	
PO								5.64			6960.67				318.98				681.59	53.57	102.86
RU	250.28							110.31				17965.80		469.00		88.02	24.07		20.82	110.31	784.27
SG		263.35		19.99	130.17	23.07	109.89		4.84				1819.15	3.53		120.35	350.09	101.36		280.25	1062.79
SA														5569.26						1062.62	650.59
SP	7.33		76.23		1936.69	394.73				15.61	144.66				12569.11	228.07	904.55			814.13	1677.14
SW		57.13			112.96	304.14	676.95	2309.08				118.65			185.73	8620.09	334.45			9231.81	10387.47
SZ		167.00	7.13			3611.70	10.85	214.86				446.25		1194.515	381.74	288.94	6074.89			7180.77	19297.09
TH				4.81			37.14						77.95				139.50	413.17		903.00	397.57
TK						19.00						256.64							502.78		799.65
UK	223.21	80.67	7.96	20.97	223.91	16243.59	301.98	2053.80	14.59	655.13	354.02	758.85	427.72	1769.98	2369.31	1030.21	1616.72	115.29	4.65	169305.60	105814.80
US	2428.20	3720.44	38.43	206.49	5264.73	32769.08	183.44	4274.28	171.76	525.99	72.45	430.49	260.14	751.71	2800.08	11309.23	5294.77	5.16		88034.31	1349383.0

Table 2.3

Counts and transaction values by year.

This table reports the raw counts and transaction values for each year. The transaction values are adjusted by the GDP deflator of the U.S., available at the U.S. Bureau of the Economic Analysis (BEA). GDP deflator is equal to 1 in the year of 2005. The transaction values are in millions of U.S. dollars.

Year	Cross-border		Domestic	
	Counts	Transaction Values	Counts	Transaction Values
1985	25	7250.67	131	40953.99
1986	51	19801.41	219	49123.56
1987	88	29626.16	267	41849.35
1988	140	34280.19	393	65890.35
1989	171	32314.52	507	46133.42
1990	224	24617.01	507	41849.14
1991	181	14992.44	471	31731.33
1992	146	10402.07	520	34818.81
1993	174	15562.87	674	43353.77
1994	212	30309.94	685	47332.01
1995	219	25767.16	762	51380.21
1996	254	35358.24	909	77810.81
1997	346	48172.88	1070	111414.66
1998	361	64317.22	1065	102249.00
1999	396	95675.98	987	126902.08
2000	482	94898.28	901	152343.33
2001	389	69123.46	832	163977.14
2002	294	57193.66	734	65603.79
2003	295	30189.80	746	52307.79
2004	288	49454.87	803	70736.81
2005	309	57702.00	837	91136.59
2006	355	62089.69	795	111296.52
2007	378	112091.33	822	104588.32
2008	267	41139.06	689	56915.40
2009	203	36278.40	555	47343.11
2010	243	65690.46	564	69378.15

Table 2.4
Counts and percent by industry.
This table reports the raw counts and percent (%) for each two-digit SIC macro-industry.

Two-digit SIC Industry	Cross-border				Domestic			
	Target		Acquirer		Target		Acquirer	
	Counts	Percent	Counts	Percent	Counts	Percent	Counts	Percent
01-09 Agriculture, Forestry, and Fishing	44	0.68	36	0.55	158	0.91	134	0.77
10-14 Mining	484	7.46	483	7.44	1815	10.41	1848	10.59
15-17 Construction	69	1.06	65	1.00	225	1.29	269	1.54
20-39 Manufacturing	3739	57.60	3961	61.02	6481	37.15	6816	39.07
40-49 Transportation, excluding Public Utilities	366	5.64	397	6.12	2401	13.76	2366	13.56
50-51 Wholesale Trade	372	5.73	258	3.97	893	5.12	802	4.60
52-59 Retail Trade	191	2.94	150	2.31	1307	7.49	1220	6.99
60-67 Finance, Insurance, and Real Estate	0	0	0	0	0	0	0	0
70-89 Services	1211	18.66	1130	17.41	4121	23.62	3957	22.68
91-99 Public Administration	15	0.23	11	0.17	44	0.25	33	0.19
Total	6491	100	6491	100	17445	100	17445	100

Table 2.5

Pooled OLS regressions: domestic deal ratio (transaction values).

This table reports results from pooled OLS regressions of cross-border ratio on real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the transaction values of domestic asset sales in the total transaction values of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target country are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Real Exchange Rate	-33.1828	-31.5473	-16.5540
	(22.4802)	(22.9123)	(27.2878)
Credit Private: Target Country	0.1650***	0.1904***	0.1864***
	(0.0607)	(0.0559)	(0.0548)
Capital Account Openness: Target Country	-5.0295***	-2.6022	-4.5190*
	(1.5106)	(2.0135)	(2.2777)
Freedom: Target Country			0.2126
			(0.2523)
Log GDP per capita: Target Country		-0.0004	-0.0003
		(0.0003)	(0.0003)
GDP per capita Growth Rate: Target Country		0.5154	0.8487
		(0.5778)	(0.5809)
Observations	507	507	396
R^2	0.0983	0.1073	0.1116

Table 2.6

Pooled OLS regressions: cross-border pair ratio (transaction values).

This table reports results from pooled OLS regressions of cross-border pair ratio on real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the transaction values of cross-border asset sales by acquirer country n in the total transaction values of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Real Exchange Rate	12.1795*	11.8627*	10.3216	10.2019	2.6301
	(6.7799)	(6.7205)	(6.8064)	(6.8072)	(6.6819)
Credit Private : Acquirer Country	0.0775***	0.0737***	0.0827***	0.0815***	0.0775***
	(0.0162)	(0.0179)	(0.0175)	(0.0175)	(0.0185)
Credit Private: Target Country	-0.1513***	-0.1016***	-0.1030***	-0.1040***	-0.1061***
	(0.0165)	(0.0183)	(0.0174)	(0.0176)	(0.0171)
Capital Account Openness: Acquirer Country			-1.8794*	-1.8214*	-3.3842**
			(1.0287)	(1.0211)	(1.3933)
Capital Account Openness: Target Country			-1.2711	-1.2190	-0.1087
			(1.0698)	(1.0885)	(1.3427)
Freedom: Acquirer Country					0.0374
					(0.1070)
Freedom: Target Country					0.0821
					(0.1240)
Log GDP per capita: Acquirer Country		1.6455	3.9358**	3.9028**	5.6210**
		(1.2752)	(1.9240)	(1.9182)	(2.4539)
Log GDP per capita: Target Country		-6.5132***	-5.4466***	-5.4609**	-5.3588*
		(1.3588)	(2.2309)	(2.2373)	(2.9742)
GDP per capita Growth Rate: Acquirer Country		0.5556**	0.4734*	0.4612*	0.4954*
		(0.2461)	(0.2437)	(0.2439)	(0.2635)
GDP per capita Growth Rate: Target Country		0.3643	0.1886	0.1766	-0.0064
		(0.3022)	(0.3050)	(0.3062)	(0.3011)
Common Language	0.9320	0.7467	0.9953	0.9983	1.2740
	(1.9695)	(1.9561)	(1.9486)	(1.9505)	(1.9696)
Geographic Distance	-0.0002	-0.0003*	-0.0004**	-0.0004**	-0.0004**
	(0.0002)	(0.00015)	(0.0002)	(0.0002)	(0.0002)
Euro				-1.5863	-1.9739
				(2.1565)	(2.1990)
Observations	2628	2628	2566	2566	2026
R^2	0.1046	0.1227	0.1403	0.1405	0.1259

Table 2.7

Pooled OLS regressions with interaction terms: cross-border pair ratio (transaction values). This table reports results from pooled OLS regressions of cross-border pair ratio on real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the transaction values of cross-border asset sales by acquirer country n in the total transaction values of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Real Exchange Rate	87.9210***	85.4999***	89.1517***	89.0506***	69.3722**
	(27.3968)	(27.1362)	(26.3510)	(26.3199)	(28.3056)
Real Exchange Rate× Credit Private Acquirer Country	-0.3083*	-0.2776*	-0.3519**	-0.3538**	-0.2512
	(0.1665)	(0.1642)	(0.1645)	(0.1645)	(0.1744)
Credit Private: Acquirer Country	0.0848***	0.0820***	0.0912***	0.0903***	0.0850***
	(0.0162)	(0.0179)	(0.0175)	(0.0175)	(0.0189)
Real Exchange Rate× Credit Private Target Country	-0.4011**	-0.4143**	-0.3821**	-0.3801**	-0.3705**
	(0.1748)	(0.1712)	(0.1675)	(0.1675)	(0.1610)
Credit Private: Target Country	-0.1489***	-0.1029***	-0.1060***	-0.1068***	-0.1094***
	(0.0169)	(0.0188)	(0.0177)	(0.0179)	(0.0176)
Capital Account Openness: Acquirer Country			-1.9286*	-1.8825*	-3.2406**
			(1.0239)	(1.0163)	(1.3966)
Capital Account Openness: Target Country			-0.9003	-0.8576	0.2620
			(1.1074)	(1.1265)	(1.3674)
Freedom: Acquirer Country					0.0187
					(0.1071)
Freedom: Target Country					0.0684
					(0.1234)
Log GDP per capita: Acquirer Country		1.3285	3.6850*	3.6566*	5.2018**
		(1.2395)	(1.9256)	(1.9206)	(2.4334)
Log GDP per capita: Target Country		-5.9572***	-5.3783**	-5.3884**	-5.1734*
		(1.3566)	(2.2898)	(2.2955)	(2.9950)
GDP per capita Growth Rate: Acquirer Country		0.4957*	0.4214*	0.4113	0.4304
		(0.2589)	(0.2555)	(0.2559)	(0.2787)
GDP per capita Growth Rate: Target Country		0.3513	0.1998	0.1906	-0.0260
		(0.2855)	(0.2891)	(0.2903)	(0.2840)
Common Language	0.8538	0.7008	0.9144	0.9171	1.2695
	(1.9529)	(1.9491)	(1.9336)	(1.9356)	(1.9518)
Geographic Distance	-0.00019	-0.00030**	-0.00033**	-0.00034**	-0.0004**
	(0.00015)	(0.00015)	(0.00015)	(0.00015)	(0.0002)
Euro				-1.2998	-1.8106
				(2.1780)	(2.2260)
Observations	2557	2557	2496	2496	1960
R^2	0.1145	0.1297	0.1482	0.1483	0.1328

Table 2.8

Pooled OLS regressions: domestic deal ratio (counts).

This table reports results from pooled OLS regressions of domestic deal ratio, real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the counts of domestic asset sales in the total counts of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target country are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Real Exchange Rate	-15.1843	-13.4607	-1.5634
	(13.1902)	(13.4785)	(13.4470)
Credit Private: Target Country	0.1438**	0.1590***	0.1525***
	(0.0536)	(0.0513)	(0.0486)
Capital Account Openness: Target Country	-3.3083***	-1.9431	-3.6924
	(1.2790)	(2.0061)	(2.3062)
Freedom: Target Country			0.3102
			(0.2320)
Log GDP per capita: Target Country		-0.0002	-0.0001
		(0.0003)	(0.0003)
GDP per capita Growth Rate: Target Country		0.6632	0.9912**
		(0.4308)	(0.4792)
Observations	507	507	396
R^2	0.1152	0.1255	0.1703

Table 2.9

Pooled OLS regressions: cross-border pair ratio (counts).

This table reports results from pooled OLS regressions of cross-border pair ratio on real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the counts of cross-border asset sales by acquirer country n in the total counts of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Real Exchange Rate	9.7358**	9.1379**	7.8217*	7.6339*	-0.8860
	(4.7806)	(4.5765)	(4.6420)	(4.6443)	(4.1998)
Credit Private : Acquirer Country	0.0635***	0.0575***	0.0629***	0.0611***	0.0517***
	(0.0137)	(0.0153)	(0.0148)	(0.0147)	(0.0144)
Credit Private: Target Country	-0.1441***	-0.0877***	-0.0907***	-0.0922***	-0.0966***
	(0.0144)	(0.0156)	(0.0140)	(0.0141)	(0.0129)
Capital Account Openness: Acquirer Country			-0.9285	-0.8380	-2.7063***
			(0.8374)	(0.8360)	(1.0316)
Capital Account Openness: Target Country			-1.4204	-1.3432	-0.1557
			(0.9468)	(0.9609)	(1.0218)
Freedom: Acquirer Country					0.1396
					(0.0864)
Freedom: Target Country					0.1124
					(0.0941)
Log GDP per capita : Acquirer Country		1.5201	2.5419	2.4901	4.1122**
		(1.0471)	(1.5914)	(1.5873)	(1.8914)
Log GDP per capita: Target Country		-7.8591***	-6.4661***	-6.4877***	-6.4083***
		(1.2269)	(2.0891)	(2.0956)	(2.2559)
GDP per capita Growth Rate: Acquirer Country		0.3725*	0.2867	0.2699	0.2521
		(0.2140)	(0.2090)	(0.2087)	(0.2185)
GDP per capita Growth Rate: Target Country		0.1665	0.0287	0.0105	-0.1965
		(0.2444)	(0.2442)	(0.2440)	(0.2103)
Common Language	0.7052	0.6369	0.7741	0.7771	0.6474
	(1.7577)	(1.7190)	(1.6814)	(1.6826)	(1.5505)
Geographic Distance	-0.0003**	-0.0004***	-0.0005***	-0.0005***	-0.0005***
	(0.00014)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Euro				-2.3643	-2.3265
				(1.5769)	(1.5666)
Observations	2619	2619	2557	2557	2015
R^2	0.1622	0.2008	0.2354	0.2363	0.2435

Table 2.10

Pooled OLS regressions with interaction terms: cross-border pair ratio (counts).

This table reports results from pooled OLS regressions of cross-border pair ratio on real exchange rates, financial development, and other control variables. The dependent variable is the proportion of the counts of cross-border asset sales by acquirer country n in the total counts of deals in target country d. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Real Exchange Rate	49.5963***	45.7181***	45.1906***	44.9816***	15.5859
	(17.8414)	(16.8432)	(16.7368)	(16.8035)	(12.8157)
Real Exchange Rate× Credit Private Acquirer Country	-0.1350	-0.0942	-0.1229	-0.1269	0.0207
	(0.1109)	(0.1069)	(0.1078)	(0.1077)	(0.0915)
Credit Private: Acquirer Country	0.0661***	0.0615***	0.0666***	0.0648***	0.0531***
	(0.0138)	(0.0153)	(0.0148)	(0.0147)	(0.0141)
Real Exchange Rate× Credit Private Target Country	-0.2256**	-0.2357**	-0.2120**	-0.2079**	-0.1822**
	(0.1050)	(0.0988)	(0.0989)	(0.0989)	(0.0785)
Credit Private: Target Country	-0.1455***	-0.0914***	-0.0954***	-0.0971***	-0.1030***
	(0.0140)	(0.0153)	(0.0133)	(0.0134)	(0.0119)
Capital Account Openness: Acquirer Country			-0.8610	-0.7658	-2.2843**
			(0.8141)	(0.8120)	(1.0106)
Capital Account Openness: Target Country			-1.2545*	-1.1661	0.0209
			(0.9669)	(0.9824)	(1.0469)
Freedom: Acquirer Country					0.1279
					(0.0824)
Freedom: Target Country					0.1162
					(0.0940)
Log GDP per capita: Acquirer Country		1.3772	2.3102	2.2515	3.5377*
		(1.0170)	(1.5747)	(1.5713)	(1.8440)
Log GDP per capita: Target Country		-7.3092***	-6.1115***	-6.1326***	-6.0181***
		(1.2174)	(2.0987)	(2.1055)	(2.2854)
GDP per capita Growth Rate: Acquirer Country		0.3760*	0.2957	0.2749	0.2598
		(0.2126)	(0.2060)	(0.2064)	(0.2092)
GDP per capita Growth Rate: Target Country		0.1780	0.0669	0.0479	-0.2010
		(0.2303)	(0.2307)	(0.2306)	(0.1922)
Common Language	0.9748	0.9059	1.0375	1.0430	1.0938
	(1.7554)	(1.7232)	(1.6808)	(1.6822)	(1.5398)
Geographic Distance	-0.00029**	-0.00036***	-0.00042***	-0.0005***	-0.0005***
	(0.00014)	(0.00014)	(0.00013)	(0.0001)	(0.0001)
Euro				-2.6849	-2.7590*
				(1.5512)	(1.5399)
Observations	2557	2557	2496	2496	1960
R^2	0.1739	0.2080	0.2440	0.2451	0.2550

Table 2.11

Robustness tests: domestic deal ratio.

This table reports results from pooled OLS regressions of cross-border ratio on real exchange rates, financial development, and other control variables. The financial development is calculated as the credit by the banking sector to GDP ratio. In columns (1) and (2), the dependent variable is the proportion of the transaction values of domestic asset sales in the total transaction values of deals in target country d. In columns (3) and (4), the dependent variable is the proportion of the counts of domestic asset sales in the total counts of deals in target country d. Details on variable construction are described in Section 2.3.3. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target country are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	Transaction Values		Counts	
	(1)	(2)	(3)	(4)
Real Exchange Rate	-38.3259	-25.6386	-20.9844	-11.7771
	(23.7919)	(29.2430)	(14.0037)	(15.0828)
Credit Banking: Target Country	0.1627***	0.1539***	0.1355**	0.1246**
	(0.0554)	(0.0532)	(0.0518)	(0.0490)
Capital Account Openness: Target Country	-2.8264	-4.8862**	-2.1176	-3.9723*
	(2.0078)	(2.2379)	(2.0642)	(2.3604)
Freedom: Target Country		0.2339		0.3235
		(0.2594)		(0.2401)
Log GDP per capita: Target Country	-0.0004	-0.0002	-0.0002	-0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
GDP per capita Growth Rate: Target Country	0.6225	0.9740	0.7873*	1.1382**
	(0.5816)	(0.5953)	(0.4421)	(0.4971)
Observations	508	397	508	397
R^2	0.1037	0.1078	0.1059	0.1498

Table 2.12

Robustness tests: cross-border pair ratio (without interaction terms).

This table reports results from pooled OLS regressions of cross-border pair ratio on real exchange rates, financial development, and other control variables. The financial development is calculated as the credit by the banking sector to GDP ratio. In columns (1) and (2), the dependent variable is the proportion of the transaction values of cross-border asset sales by acquirer country n in the total transaction values of deals in target country d. In columns (3) and (4), the dependent variable is the proportion of the counts of cross-border asset sales by acquirer country n in the total counts of deals in target country d. Details on variable construction are described in Section 2.3.3. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	Transaction Values		Counts	
	(1)	(2)	(3)	(4)
Real Exchange Rate	8.7690	1.2176	6.2988	-2.2522
	(6.8757)	(6.7107)	(4.6950)	(4.2389)
Credit Banking: Acquirer Country	0.0657***	0.0627***	0.0460***	0.0401***
	(0.0164)	(0.0156)	(0.0131)	(0.0119)
Credit Banking: Target Country	-0.0983***	-0.1045***	-0.0891***	-0.0966***
	(0.0182)	(0.0160)	(0.0137)	(0.0116)
Capital Account Openness: Acquirer Country	-1.7804*	-3.3163**	-0.7643	-2.5990**
	(1.0232)	(1.3732)	(0.8435)	(1.0135)
Capital Account Openness: Target Country	-1.2966	-0.1308	-1.4081	-0.1772
	(1.0900)	(1.3267)	(0.9597)	(1.0039)
Freedom: Acquirer Country		0.0824		0.1719**
		(0.1015)		(0.0822)
Freedom: Target Country		0.0617		0.0945
		(0.1196)		(0.0913)
Log GDP per capita: Acquirer Country	4.4592**	5.7111**	3.0029*	4.1491**
	(1.9011)	(2.4076)	(1.5736)	(1.8659)
Log GDP per capita: Target Country	-5.9025***	-5.6526*	-6.8278***	-6.6462***
	(2.2210)	(2.9397)	(2.0506)	(2.2050)
GDP per capita Growth Rate: Acquirer Country	0.5258**	0.5519**	0.3250	0.3061
	(0.2459)	(0.2620)	(0.2105)	(0.2169)
GDP per capita Growth Rate: Target Country	0.0651	-0.1325	-0.0965	-0.3212
	(0.3037)	(0.3002)	(0.2387)	(0.2071)
Common Language	1.0461	1.2246	0.7464	0.5382
	(1.9049)	(1.9314)	(1.6409)	(1.5114)
Geographic Distance	-0.0004**	-0.0004**	-0.0005***	-0.0005***
	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Euro	-1.4271	-1.7568	-2.2349	-2.1089
	(2.1754)	(2.2010)	(1.5692)	(1.5451)
Observations	2566	2026	2557	2015
R^2	0.1446	0.1352	0.2411	0.2584

Table 2.13

Robustness tests: cross-border pair ratio (with interaction terms).

This table reports results from pooled OLS regressions of the cross-border pair ratio on real exchange rates, financial development, and other control variables. The financial development is calculated as the credit by the banking sector to GDP ratio. In columns (1) and (2), the dependent variable is the proportion of the transaction values of cross-border asset sales by acquirer country n in the total transaction values of deals in target country d. In columns (3) and (4), the dependent variable is the proportion of the counts of cross-border asset sales by acquirer country n in the total counts of deals in target country d. Details on variable construction are described in Section 2.3.3. Variable definitions and data sources are as described in Table 2.A.1, and summary statistics are reported in Table 2.A.2. Standard errors robust to heteroskedasticity and clustered by target-acquirer country pair are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	Transaction Values		Counts	
	(1)	(2)	(3)	(4)
Real Exchange Rate	64.7263**	56.2736**	28.7056	10.9807
	(28.5375)	(28.2059)	(18.4975)	(12.9544)
Real Exchange Rate× Credit Banking Acquirer Country	-0.2414*	-0.1890	-0.0686	0.0068
	(0.1430)	(0.1431)	(0.0962)	(0.0819)
Credit Banking: Acquirer Country	0.0800***	0.0788***	0.0537***	0.0456***
	(0.0162)	(0.0164)	(0.0135)	(0.0127)
Real Exchange Rate× Credit Banking Target Country	-0.2179	-0.2644*	-0.1126	-0.1236*
	(0.1626)	(0.1465)	(0.1031)	(0.0763)
Credit Banking: Target Country	-0.1034***	-0.1112***	-0.0912***	-0.1010***
	(0.0173)	(0.0155)	(0.0130)	(0.0110)
Capital Account Openness: Acquirer Country	-1.7175*	-3.0452**	-0.6875	-2.2797**
	(1.0238)	(1.3896)	(0.8238)	(0.9998)
Capital Account Openness: Target Country	-1.1785	-0.0108	-1.3832	-0.1646
	(1.1208)	(1.3342)	(0.9764)	(1.0175)
Freedom: Acquirer Country		0.0218		0.1446*
		(0.1007)		(0.0790)
Freedom: Target Country		0.0527		0.0993
		(0.1201)		(0.0918)
Log GDP per capita: Acquirer Country	3.7190**	5.0821**	2.4997*	3.6227**
	(1.8883)	(2.3912)	(1.5522)	(1.8228)
Log GDP per capita: Target Country	-5.4590**	-5.0013*	-6.3351***	-5.9941***
	(2.2861)	(2.9452)	(2.0746)	(2.2223)
GDP per capita Growth Rate: Acquirer Country	0.5110**	0.5646**	0.2912	0.2923
	(0.2463)	(0.2637)	(0.1997)	(0.1969)
GDP per capita Growth Rate: Target Country	0.1000	-0.0795	-0.0652	-0.2921
	(0.2834)	(0.2720)	(0.2261)	(0.1853)
Common Language	0.8440	1.2700	0.7406	0.7882
	(1.8875)	(1.8973)	(1.6416)	(1.4863)
Geographic Distance	-0.0004**	-0.0004**	-0.0005	-0.0005***
	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Euro	-1.4085	-1.9428	-2.3126	-2.3279
	(2.1934)	(2.2134)	(1.5757)	(1.5469)
Observations	2505	1972	2505	1972
R^2	0.1540	0.1446	0.2477	0.2660

Table 2.A.1

Definitions of variables.

This table describes the definitions and data sources of all the variables used in the regressions.

Variable	Definition
Cross-border Pair Ratio: Counts	Proportion of the counts of cross-border asset sales involving acquirer country n in the total counts of asset sales in target country d. (Source: SDC)
Cross-border Pair Ratio: Transaction Values	Proportion of the transaction values of cross-border asset sales involving acquirer country n in the total transaction values of asset sales in target country d. (Source: SDC)
Domestic Deal Ratio: Counts	Proportion of the counts of domestic asset sales in the total counts of asset sales in target country d. (Source: SDC)
Domestic Deal Ratio: Transaction Values	Proportion of the transaction values of domestic asset sales in the total transaction values of asset sales in target country d. (Source: SDC)
Changes in Real Exchange Rates	Annual changes in the real exchange rate. The real exchange rate is defined as the value of the acquirer country currency in terms of the target country currency. (Source: Penn World Tables 7.0)
Changes in Real Exchange Rates: Target Country	Annual changes in the real exchange rate of the target country from year t-1 to year t. The real exchange rate is defined as the value of the U.S. Dollars in terms of the target country currency. (Source: Penn World Tables 7.0)
Credit Private	Domestic credit to the private sector to GDP ratio. (Source: World Bank)
Credit Banking	Domestic credit provided by the banking sector to GDP ratio. (Source: World Bank)
Capital Account Openness	Chinn-Ito index of capital account openness. (Source: http://web.pdx.edu/~ito/Chinn-Ito_website.htm.)
Log GDP per capita	Logarithm of the GDP per capita, PPP in constant 2005 international dollars. (Source: World Bank)
GDP per capita Growth Rate	GDP per capita annual growth rate in percentage. (Source: World Bank)
Freedom Index	The average of the ten economic freedom scores measuring ten components of freedom. The ten components of economic freedom are: Business Freedom, Trade Freedom, Fiscal Freedom, Government Spending, Monetary Freedom, Investment Freedom, Financial Freedom, Property rights, Freedom from Corruption, and Labor Freedom. Tracked by The Wall Street Journal and The Heritage Foundation, the Index starts from 1995 and covers 183 countries. (Source: http://www.heritage.org/index/Explore.aspx?view=by-region-country-year)
Euro	Dummy variable taking the value of 1 if the target country and the acquirer country are European Union (EU) members that have adopted the euro (€) as their common currency and sole legal tender and 0 otherwise. (Source: https://www.cia.gov/library/publications/the-world-factbook/index.html)
Common Language	Dummy variable taking the value of 1 if the target country and the acquirer country share a common language and 0 otherwise. (Source: https://www.cia.gov/library/publications/the-world-factbook/index.html)
Geographic Distance	The variable "distw" from CEPII. (Source: http://www.cepii.fr/anglaisgraph/bdd/distances.htm)

Table 2.A.2

Summary statistics.

This table reports summary statistics for the variables used in the regressions. Variable definitions are described in Table 2.A.1.

Variable	Mean	Standard Deviation	Min	Max	Observations
	Panel A: Country Pair Analysis				
Cross-border Pair Ratio: Counts	15.6138	20.6320	0.1364	100	2936
Cross-border Pair Ratio: Transaction Values	17.3608	27.3115	0.0016	100	2936
Changes in Real Exchange Rates	0.0172	0.2970	-0.9015	9.1547	42514
Credit Private	82.0818	48.9452	0	231.6298	43596
Credit Banking	98.8889	54.1820	0	320.5309	43596
Capital Account Openness	1.0133	1.5635	-1.8438	2.4776	42630
Freedom Index	67.5654	9.3839	45.1	90.5	28560
Log GDP per capita	9.6640	0.8526	6.7021	11.2134	46326
GDP per capita Growth Rate	2.4236	3.5392	-14.5684	13.6051	46200
Common Language	0.1130	0.3165	0	1	46956
Geographic Distance	7645.34	4979.253	160.9283	19539.48	46956
	Panel B: Target Country Analysis				
Domestic Deal Ratio: Counts	57.8012	27.0287	6.6667	100	674
Domestic Deal Ratio: Transaction Values	50.1908	35.7921	0.0299405	100	674
Changes in Real Exchange Rates: Target Country	0.0249	0.1224	-0.8853	1.4294	1022
Credit Private	82.0818	48.9682	0	231.6298	1038
Credit Banking	98.8889	54.1820	0	320.5309	1038
Freedom Index	67.5654	9.3907	45.1	90.5	680
Capital Account Openness	1.0133	1.5642	-1.8438	2.4776	1015
Log GDP per capita	9.6640	0.8529	6.7021	11.2134	1103
GDP per capita Growth Rate	2.4236	3.5407	-14.5684	13.6051	1100

Table 2.A.3

Cross-border asset sales screening criteria.

This table describes the complete set of screening criteria used to construct the cross-border asset sales sample.

Request	Data Item in SDC	Request Description
1	Date Announced	01/01/1985 to 12/31/2010
2	Target Nation	In the target and acquirer country list, see Table 2.A.8
3	Deal Value	Equal to or greater than 1 million U.S. Dollars
4	Acquirer Nation	In the target and acquirer country list, see Table 2.A.8
5	Deal Status	Completed or unconditional
6	Deal Type	NOT leveraged buyouts, tender offers, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, and privatizations
7	Form of the Deal	"Acquisition of assets" or "acquisition of certain assets"
8	Consideration Sought Category	Asset
9	Acquirer Public Status	NOT Government agency
10	Target Public Status	NOT Government agency
11	Deal Attitude	Friendly
12	Acquisition Techniques	Divestiture
13	Acquisition Techniques	NOT Bankruptcy
14	Cross-border deal flag	Yes
15	Location of the acquirer and the target firms	The acquirer and the target firms are not located in the same nation.
16	"% of Shares Acq." and "% Owned After Transaction"	"% of Shares Acq."=100 and "% Owned After Transaction"=100: the asset must be wholly owned by the seller prior to the sale, and the transaction must transfer the seller's full ownership of the asset to the buyer.
17	Primary SIC codes of the acquirer and the target firms	Exclude the financial industries (SIC codes 6000-6799) and utilities industries (SIC codes 4900-4999).

Table 2.A.4
Target and acquirer country list.
This table reports the target and acquirer country names.

Argentina (AR)	Finland (FN)	Japan (JP)	Russia (RU)
Australia (AS)	France (FR)	South Korea (SK)	Singapore (SG)
Austria (AU)	Germany (WG)	Luxembourg (LX)	South Africa (SA)
Belgium (BE)	Greece (GR)	Malaysia (MA)	Spain (SP)
Brazil (BR)	Hong Kong (HK)	Mexico (MA)	Sweden (SW)
Canada (CA)	Hungary (HU)	Netherlands (NT)	Switzerland (SZ)
Chile (CE)	India (ID)	New Zealand (NZ)	Thailand (TH)
China (CH)	Indonesia (IN)	Norway (NO)	Turkey (TK)
Colombia (CO)	Ireland (IR)	Philippines (PH)	United Kingdom (UK)
Czech Republic (CC)	Israel (IS)	Poland (PO)	United States (US)
Denmark (DN)	Italy (IT)	Portugal (PO)	

CHAPTER 3

PRODUCT MARKET COMPETITION, HETEROGENEOUS FIRMS, AND WORLD MARKET FOR CORPORATE ASSETS

3.1 Introduction

Cross-border asset sales have experienced dramatic growth in the past decades.[1] During the period from 1986 to 1990, the average annual count and transaction values are 134 and 28.13 billion dollars, respectively. During the period from 2006 to 2010, the average count and transaction values have more than doubled, increasing to 289 and 63.46 billion dollars, respectively. In contrast, domestic asset sales did not significantly change during these two periods: 378 deals in counts and 48.97 billion dollars in transaction values over the first period and 685 deals and 77.90 billion over the second period.[2] As a result, cross-border asset sales have been playing an increasingly important role in reallocating resources around the world.

Moreover, as the process of global economic integration is expanding, the production of transnational corporations (TNCs) is increasing and firms are facing greater competition from

[1]Several key features distinguish asset sales from mergers. Hege, Lovo, Slovin, and Sushka (2009) summarize the following (page 682). First, an asset sale is governed by contract law and the business judgment rule. Second, mergers are generally buyer-initiated, while asset sales are generally seller-initiated. Third, sellers of assets foster competitive and coetaneous bidding via an auction like process, followed by private negotiations between a seller and a selected buyer.

[2]These calculations are based on data from Securities Data Corporation Platinum (SDC). To mitigate the influence of business cycles, I report the averages for two five-year periods: 1986-1990 and 2006-2010. Although only after 1992 does SDC cover deals of any value, the calculations may not be affected by the coverage of SDC as certain restrictions to identify the asset sales are imposed.

multinationals entering local markets. International production by TNCs, i.e., value added by foreign affiliates, is expanding, with sales, employment and assets of foreign affiliates all increasing, as shown in Table 3.A.3. As indicated in Figure 3.A.1, UNCTAD estimates that in 2010 international production accounts for around 40% of TNCs' total value added, up from around 35% in 2005, and that it is more than one-tenth of global GDP and one-third of world exports. According to the findings of UNCTAD's annual survey of the 100 largest TNCs in the world, foreign employment accounts for more than 50% of their total employment, as shown in Table 3.A.4.

These dramatic developments call for a study on how firms' heterogeneity, especially in terms of their competitiveness in the product market and their productivity, affects their corporate asset transactions both at home and abroad. Based on studies on domestic asset transactions, I extend the analysis to incorporate the world market for corporate assets. Abstracting from the dynamics, I introduce a new characteristic of firms, namely, the competitiveness in the product market, measured by the excess profitability, which affects firms' investment decisions, both in the domestic country and abroad. I investigate firms' decisions on whether to invest abroad and which mode to choose in the foreign country, i.e., making new investment or purchasing existing assets.

The theoretical model featuring an open-economy set-up produces an endogenous self-selection pattern that links firms' asset purchases and sales to their fundamentals. I show that, other things being equal, firms with high competitiveness are more likely to buy assets on the overseas markets, and they are more likely to sell assets on the domestic market. Firms with high productivity are more likely to buy assets on both the domestic and overseas markets, and they are less likely to sell assets on the domestic market, which mirrors the established results regarding productivity.

The numerical analysis further shows that the relationship between the amount of assets sold and a firm's of competitiveness is nonlinear. Specifically, when firms sell assets in the domestic country, as their excess profitability increases, the amount of assets sold first increases, but after their excess profitability reaches a threshold level, when firms become even more competitive, the amount of assets bought actually starts to decrease.

Based on the theoretical results, I identify testable predictions. I then obtain comprehensive data on the asset transactions of U.S. firms, in the home country and overseas, from the Securities Data Corporation (SDC) Platinum.[3] I apply Logit models and Heckman selection models and find robust empirical evidence consistent with the model's predictions. The analysis also indicates that large firms are more likely to participate in asset purchases and sales in the domestic country, which is consistent with the findings inWarusawitharana (2008). In addition, I find that large firms also have a higher likelihood of purchasing assets abroad, which adds to the existing research.

This paper is related to two strands of literature. The first one is research on the competitiveness of firms on product markets. Many papers investigate the impact of product market competition on firms' activities and performance from different perspectives. Gaspar and Massa (2005) find that a firm's monopoly power in the product market reduces the dispersion of earnings forecasts and lowers idiosyncratic return volatility. Hou and Robinson (2006) find that it lowers risk-adjusted expected returns; Irvine and Pontiff (2009) find that it lowers idiosyncratic return volatility. Peress (2010) finds that competition in the product market stimulates trading,

[3]Çolak and Whited (2007) use this data set to investigate divestitures. Warusawitharana (2008) and Borisova, John, and Salotti (2011) use this data set to examine asset purchases and sales.

including that by insiders, enhances the informativeness of stock prices, and improves the efficiency of capital allocation. Lyandres and Watanabe (2011) show that the expected returns of firms with reliable products can decrease with competition in the product market. Using data on firms from different countries, Healy, Serafeim, Srinivasan, and Yu (2011) find that corporate profitability mean reverts faster in countries where product and capital markets are more competitive. Giroud and Mueller (2011) find that weakly governed firms have lower labor productivity and higher input costs, and make more value-destroying acquisitions only in noncompetitive industries, which indicates that product market competition has impact on the effects of governance on firms' performance. Spearot (2012) shows that if varieties within an industry are close to perfect substitution, firms with high productivity choose to invest.

In this paper, I study how competitiveness impacts the corporate asset transactions of firms both in the domestic country and abroad. The theoretical model captures the asset purchases as well as the sales in a unified framework. I find that firms with high competitiveness are more likely to buy assets on the overseas markets, and they are more likely to sell assets on the domestic market, which adds to the existing findings on the impact of product market competition. These findings do not mean that the valuation effects through the stock market on corporate investment or mergers and acquisitions (M&As) are not important. Clearly, a large proportion of M&As are financed by stocks, and the valuation of the acquirer or the target can have substantial effects, as emphasized in the literature. Instead, the findings in this paper that firms' characteristics regarding the fundamentals are also important in understanding firms' asset transactions worldwide, are best viewed as complementary to the existing literature.

The second strand consists of the studies on firms' asset transactions. Based on studies on domestic asset transactions, I extend the existing analysis to an open economy and derive predictions on firms' investment decisions overseas. This paper is most closely related to

Warusawitharana (2008) and Yang (2008). Warusawitharana (2008) shows that profitability and firm size determine asset purchases and sales, and he provides supporting evidence for these predictions using data from SDC. Yang (2008) shows that changes in productivity, rather than productivity levels, affect firms' asset transaction decisions: Firms with rising productivity buy assets and firms with falling productivity downsize (rising buys falling).

Other related studies on domestic asset transactions include that of Maksimovic and Phillips (2002), who model asset reallocation as firms' responses to aggregate demand shocks. Jovanovic and Rousseau (2002) show that asset sales are driven by cross-sectional differences in productivity and that firms with high productivity buy firms with low productivity (high buys low). Levine (2011) shows that low-cost producers seek to acquire firms with good projects which are not fully implemented due to high costs, and that the reallocation generates gains. Lang, Poulsen, and Stulz (1995) argue that management sells assets to obtain the cheapest funds to pursue its objectives rather than for operating efficiency alone. They also find that the typical firm in their sample performs poorly before the sale, and that the average stock-price reaction to asset sales is positive only when the proceeds are used for stock repurchases or to reduce the debt. Schlingemann, Stulz, and Walkling (2004) find that firms are more likely to divest segments from industries with a more liquid market for corporate assets, unrelated segments, poorly performing segments, and small segments.

This paper is also related to studies on cross-border asset sales and foreign direct investment (FDI). In an international context, a few studies explore cross-country comparisons on *cross-border* investment. Froot and Stein (1991) show that when entrepreneurs use external finance from the capital market with informational imperfections to bid for assets, the wealth effects caused by the depreciation of the target country currency enable foreign entrepreneurs to bid a higher price for the target country assets, and thereby acquire more assets in the target country.

Borisova, John, and Salotti (2011) study the cross-border and domestic divestitures by U.S. firms from 1998 to 2008. They find that asset sales to foreign buyers yield higher abnormal returns to the seller as compared with domestic sales. This incremental return is driven by liquidity-constrained sellers engaging in cross-border transactions. Larger seller returns in these international deals are associated with foreign buyers' greater chance of asset overvaluation due to information asymmetry, foreign buyers' options to expand geographically, and favorable economic conditions in their respective home countries. Helpman, Melitz, and Yeaple (2004) investigate firms' choices between exporting and FDI when serving foreign markets. They show that the heterogeneity in productivity of firms can explain the different modes to serve foreign markets: Only the most productive firms engage in FDI.

In order to reflect the increasingly important role of cross-border asset transactions and product market competition from foreign affiliates currently in the global economy, I extend the framework in Helpman, Melitz, and Yeaple (2004) in two dimensions. First, I exclude the firms' entry mode of exporting but add the asset purchases overseas as a new mode to obtain capital in foreign markets. Second, in addition to the firms' heterogeneity in productivity, I introduce the heterogeneity in the firms' excess profitability and the amount of assets-in-place. I make new predictions regarding the impact of firms' heterogeneous characteristics on asset transactions both at home and abroad, and in particular I link the firms' excess profitability in the product market to their cross-border asset reallocation decisions, thereby complementing the existing research on asset transactions.[4]

[4]Makaew (2009), using data on cross-border M&As, compares the productivity of the acquirers with that of the targets, and finds that acquirers tend to be more productive and targets tend to be less productive.

The remainder of this paper is organized as follows. Section 3.2 develops a theoretical model on asset sales featuring firms with heterogeneous competitiveness, productivity, and assets-in-place. Section 3.3 solves the model numerically and presents comparative statics regarding firms' decisions. The simulation results are also presented in this section. The empirical analysis follows in Section 3.4. Section 3.5 concludes the paper. All the proofs are collected in the Appendix.

3.2 Theoretical Model

3.2.1 General Setup

Suppose that there are N countries in the world. In any industry of a typical country, there is a continuum $[0,1]$ of firms. A representative firm is characterized by its competitiveness, productivity, and assets-in-place. Assets-in-place are the capital stock formed by former investment and generate revenues for the firm. I follow Yang (2008) in assuming that the firm uses only capital to produce goods, which allows us to focus better on the firm's investment decisions in its home country and overseas.[5] Given its competitiveness, productivity, and assets-in-place, the firm makes investment decisions to maximize its profit. To focus on the firm's asset purchases or sales decisions, I further assume that the markets for tangible assets are segmented, or in other words, physical goods are immobile across borders and there are no exports or imports of goods. However, as is standard in the literature, intangible assets, such as the technology used in production, is mobile. As a result, I focus on the multinational production worldwide.

[5]Warusawitharana (2008) assumes that each firm uses capital and labor as inputs; however, he further assumes that the wage rate is exogenous, and thereby the labor input decision can be substituted out and the firm's profit can be written solely in terms of its capital stock.

3.2.2 Firm's Profit Maximization Problem

Let us take a snapshot of the investment decisions of a representative firm at a certain time spot in this open economy. In country i, a representative firm, denoted as firm (i,v), produces the variety of good v, using only capital. This firm is characterized by a random vector $(\alpha_{i,v}, Z_{i,v}, S_{i,v})$, where $\alpha_{i,v}$ is the competitiveness, $Z_{i,v}$ is the productivity, namely the units of good *v* produced per unit of capital; and $S_{i,v}$ is the assets-in-place. $\alpha_{i,v}$, $Z_{i,v}$, and $S_{i,v}$ follow a certain joint distribution. The firm sells goods on a product market characterized by monopolistic competition. Specifically, the firm faces the inverse demand function of its output, $p_{i,v}(Y_{i,v}) = \beta Y_{i,v}^{-(1-\alpha_{i,v})}$, where $p_{i,v}$ and $Y_{i,v}$ are the price and quantity of good *v* demanded by the consumers,[6] $\beta > 0$, and $0 < \alpha_{i,v} < 1$. Therefore, the firm enjoys a certain market power.[7]

In order to adjust its amount of capital needed, the firm has two options: It makes new investment itself or participates in the asset markets to purchase or sell existing assets. There is a fixed cost, f_D, for participating in domestic asset transfers and a fixed cost, f_F, for participating in cross-border transactions. These costs account for transaction costs such as legal fees. I assume that $f_F > f_D$; that is, cross-border transactions incur a higher cost to search for partners overseas. I follow Helpman, Melitz, and Yeaple (2004) in assuming that if the firm produces goods in the foreign country, it needs to pay a fixed cost f_I, which is the overhead cost of production.

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[6]The corresponding demand function $Y_{i,v}(p_{i,v}) = \beta p_{i,v}^{-\left(\frac{1}{1-\alpha_{i,v}}\right)}$ can be derived from a utility maximization problem with a quasi-linear utility function.

[7]The demand elasticity of good $Y_{i,v}$, $\left|\frac{d \ln Y_{i,v}}{d \ln p_{i,v}}\right|$, equals $\frac{1}{1-\alpha_{i,v}}$ and is increasing in $\alpha_{i,v}$. Therefore, the higher $\alpha_{i,v}$, the more elastic the demand for good $Y_{i,v}$ and the less market power firm (i,v) enjoys.

The firm makes two types of decisions: one is its production and investment decisions in its home country, and the other is those in the other $N-1$ countries. Following Helpman, Melitz, and Yeaple (2004), I assume that each firm independently maximizes the profit obtained from the home country and from these foreign countries, instead of maximizing the joint profit. To ease notation, I omit good index v henceforth. I take the new investment as the numeraire, and as a result, the unit price of the new investment is normalized to 1, and the prices of existing capital in country i, denoted by q_i, are endogenously determined in the equilibrium. The following two subsections describe the firm's profit maximization decisions in the home country and abroad, respectively. The equilibrium conditions are detailed in Appendix A.

3.2.2.1 Profit Maximization in the Home Country

I first analyze the firm's profit maximization in its *home* country i. When firm (i,v) chooses its optimal amount of working capital, it has two options: make new investment $I_{ii} \geq 0$, or purchase or sell existing capital on the asset market. If it does sell assets, it cannot sell more than what it has in hand, that is, $X_{ii} \geq -S_i$. Once the assets are installed, they are equally productive. Therefore, the total amount of capital available to the firm is

$$K_{ii} = S_i + I_{ii} + X_{ii},$$

where S_i, I_{ii}, and X_{ii} are the assets-in-place, the new investment, and the assets transferred. The production function of firm (i,v) is

$$Y_{ii} = Z_i\left(S_i + I_{ii} + X_{ii}\right).$$

The cost of producing output Y_{ii} is

$$C\left(I_{ii}, X_{ii}\right) = I_{ii} + q_i X_{ii} + f_D 1_{x_{ii}\neq 0},$$

Where 1 is an indicator function denoting that the firm participates in asset purchases or sales on the asset market.

The firm chooses $I_{ii} \geq 0$ and $X_{ii} \geq -S_i$ to maximize its profit in the *home* country; that is,

$$\max_{I_{ii}\geq 0,\, X_{ii}+S_i\geq 0} p_{ii}Y_{ii} - C_{ii} = \beta Z_i^{\alpha}\left(S_i + I_{ii} + X_{ii}\right)^{\alpha} - \left(I_{ii} + q_i X_{ii} + f_D 1_{X_{ii}\neq 0}\right).$$

The firm chooses whether to participate in the domestic asset transaction market. So, the firm has two options: (1) non-participation $(X_{ii} = 0)$, or (2) participation $\left(X_{ii} \neq 0\right)$. The firm compares the profits from these two options and makes the decision in its home country. To be specific, let π_{ii}^{*}, $\pi_{X_{ii}=0}$, and $\pi_{X_{ii}\neq 0}$, denote the equilibrium profit in the home country, the profit under non-participation and participation, and let * indicate the equilibrium for the relevant variables, the maximum amount of profit from the production in the home country is

$$\pi_{ii}^{*} = \max\left\{\pi_{X_{ii}=0}, \pi_{X_{ii}\neq 0}\right\},$$

where $\pi_{X_{ii}=0} = p_{ii}^{*}Y_{ii}^{*} - I_{ii}^{*}$ and $\pi_{X_{ii}\neq 0} = p_{ii}^{*}Y_{ii}^{*} - \left(q_i X_{ii}^{*} + f_D\right)$.

3.2.2.2 Profit Maximization Overseas

Regarding the firm's profit maximization *overseas*, in any of the other $N-1$ countries, for example, foreign country j, without loss of generality, firm (i,v) can either make new investment (greenfield FDI) $I_{ij} \geq 0$ or purchase existing assets (cross-border asset purchases) $X_{ij} \geq 0$ on the asset market in country j. As the firm takes only its production technology with it when producing goods locally in country j,[8] the total amount of capital available to the firm is

$$K_{ij} = I_{ij} + X_{ij}.$$

The production function of firm (i,v) in country j is

$$Y_{ij} = Z_i\left(I_{ij} + X_{ij}\right).$$

The cost of producing output Y_{ij} is

$$C\left(I_{ij}, X_{ij}\right) = I_{ij} + q_j X_{ij} + f_F 1_{X_{ij}\neq 0} + f_I.$$

The firm chooses $I_{ij} \geq 0$ and $X_{ij} \geq 0$ to maximize its profit in country j; that is, the firm's profit

[8]Regarding the multinational corporation, assets-in-place in the home country do not enter the firm's production function when it is producing goods locally in a foreign country.

maximization problem is

$$\max_{I_{ij}\geq 0, X_{ij}\geq 0} \beta Z_i^{\alpha}\left(I_{ij}+X_{ij}\right)^{\alpha}-\left(I_{ij}+q_j X_{ij}+f_F 1_{X_{ij}\neq 0}+f_I\right).$$

When the profit obtained from country j is positive, the firm enters country j. In order to produce in country j, the firm chooses whether to participate in the asset transaction market in country j: (1) non-participation $(X_{ij}=0)$, i.e., the firm makes new investment and does not purchase existing assets from foreign firms; or (2) participation $\left(X_{ij}>0\right)$, i.e., instead of making new investment, the firm purchases existing assets from foreign firms. The firm compares the profits in these two cases and determines its amount of investment in country j. The maximum amount of profit from the production in country j is

$$\pi_{ij}^{*}=\max\left\{\pi_{X_{ij}=0}, \pi_{X_{ij}\neq 0}\right\},$$

where $\pi_{X_{ij}=0}=p_{ij}^{*}Y_{ij}^{*}-\left(I_{ij}^{*}+f_I\right)$ and $\pi_{X_{ij}\neq 0}=p_{ij}^{*}Y_{ij}^{*}-\left(q_j X_{ij}^{*}+f_F+f_I\right)$.

3.2.3 Equilibrium

In this open economy, the equilibrium is characterized by the following conditions which are simultaneously satisfied in each country $i\in\{1,2,...,N\}$: (1) For any firm v, its profit is maximized, and (2) the asset market in each country is cleared. These conditions can be expressed in terms of the excess demand for the existing assets in each country i, which is a function of the price of existing assets in country i, q_i. The equilibrium is characterized by the set of conditions that the excess demand in all the countries is equal to 0, i.e.,

$$E\left[X_{ii}\left(q_i^{*}\right)\right]+\sum_{j=1,\, j\neq i}^{N} E\left[X_{ji}\left(q_j^{*}\right)\right]=0, \text{ for } i\in\{1,2,...,N\}, \tag{3.1}$$

where $E[\cdot]$ denotes the integration over all the firms given the joint distribution of the firm characteristics α, Z, and S, $X_{ii}(\cdot)$ is the quantity of assets transferred between firms of country i, and $X_{ji}(\cdot)$ is the quantity transferred between firms of country i (the target firms) and firms of country j (the acquirer firms) on country i's asset market.

In order to illustrate the intuition, I focus on the symmetric case where the *N* countries in the

world are identical. In this scenario, the prices of existing assets in all the countries are equalized, and I denote this price as q, and the set of conditions (3.1) boil down to the following equation in terms of the equilibrium price q^*:

$$E\left[X_{ii}\left(q^*\right)\right]+\left(N-1\right)E\left[X_{ji}\left(q^*\right)\right]=0. \tag{3.2}$$

3.3 Numerical Analysis and Simulation

3.3.1 Numerical Solution

The complexity of the model precludes analytical solutions, therefore, I solve the equilibrium of the model using numerical analysis. In order to do this , I further make assumptions on the distribution of the firm characteristics and specify the parameter values. I follow the procedures in Appendix B and solve the equilibrium numerically.

Let $a=-\ln\left(\frac{1}{\alpha}-1\right)$,[9] $s=\log S$, and $z=\log Z$. I assume that a, s, and z follow a joint normal distribution, that is,

$$\begin{pmatrix} a \\ s \\ z \end{pmatrix} \sim N\left(\begin{pmatrix} \bar{a} \\ \bar{s} \\ \bar{z} \end{pmatrix}, \begin{bmatrix} \sigma_a^2 & \rho_{as}\sigma_a\sigma_s & \rho_{az}\sigma_a\sigma_z \\ \rho_{as}\sigma_a\sigma_s & \sigma_s^2 & \rho_{sz}\sigma_s\sigma_z \\ \rho_{az}\sigma_a\sigma_z & \rho_{sz}\sigma_s\sigma_z & \sigma_z^2 \end{bmatrix}\right). \tag{3.3}$$

Since there are no well-established values for the parameters in the existing literature, the specific value to attach to the model's parameters is surely debatable. In order to simplify the computation, I analyze the case of two symmetric countries, i.e., $N=2$. I set the mean of the log of the productivity as $\bar{z}=\log(0.5)$, the mean of the log of the assets-in-place as $\bar{s}=\log(0.5)$, the mean of the competitiveness parameter as $\bar{a}=1$, the standard deviations as $\sigma_z=\sigma_s=\sigma_a=0.2$, the correlation between the firm's competitiveness, productivity, and assets-in-place as

[9] I use the Logistic transformation $\alpha=\frac{1}{1+e^{-a}}$ to meet the restriction $0<\alpha<1$.

$\rho_{as} = \rho_{az} = \rho_{sz} = 0$, the demand parameter as $\beta = 1$, and the fixed costs of investment as f_D, f_F, and $f_I = 0.02$. I illustrate the equilibrium in this example below.

3.3.1.1 Equilibrium Price of Existing Assets

Given the above parameter values, the equilibrium price of existing assets is $q^* = 0.729$. The reason why q^* is less than 1 is intuitive. The mechanism behind the equilibrium is the trade-off between the variable cost and the fixed cost in the firm's profit maximization decisions: If it pays the fixed cost, it receives a discount on the variable cost for per unit of assets transferred. Given the realization of the productivity and the excess profitability, firms with extremely large assets-in-place would like to sell part of their assets; yet, for any expanding firms, if they would like to participate in the asset market that incurs the transaction cost, none of them would like to purchase assets if the price of existing assets is greater than or equal to 1, which is the cost of making new investment themselves. Therefore, relative to making new investment, if firms do participate in asset transactions, they only pay the discounted variable cost of q per unit of capital transferred; however, in order to participate in asset transactions, they have to pay the fixed cost f_D or f_F.

3.3.1.2 Investment Decisions

I first analyze the overseas market for corporate assets. Figure 3.1 plots the decisions of the firms characterized by different combinations of competitiveness and productivity. The model predicts an interesting sorting pattern regarding firms' investment decisions abroad. Given firms' productivity, firms with low excess profitability do not engage in overseas investment; firms with medium excess profitability make new investment in the foreign country; and highly competitive firms purchase foreign assets from local firms in the foreign country. On the other hand, given firms' excess profitability, firms with low productivity do not make any investment in the foreign country; firms with medium productivity make new investment in the foreign

country; and highly productive firms engage in asset purchases on the foreign asset market.

Next, I investigate the domestic asset market. In order to compare firms' decisions on the domestic market with those on the overseas market, I make additional assumptions on the amount of assets-in-place and illustrate how firms' decisions vary with the changes in excess profitability and productivity. In Figure 3.2, I fix the assets-in-place at the mean value $\bar{s} = \log(0.5)$ and plot firms' investment decisions in the domestic country. Holding firms' productivity fixed, firms with lower excess profitability maintain their levels of investment, neither making new investment nor purchasing existing assets from or selling their assets to other firms, while firms with higher excess profitability sell their existing assets, which suggests that firms with higher excess profitability are more likely to sell assets on the domestic market. On the other hand, holding excess profitability fixed, firms with lower productivity downsize, while firms with higher productivity maintain their existing levels of investment.

3.3.1.3 Excess Profitability

In order to gain insight into how the quantities of the new investment and the assets transferred in equilibrium vary with firms' excess profitability, I plot firms' decisions on these quantities. Specifying all the other parameter values as above, I now set the standard deviations as $\sigma_z = \sigma_s = 10^{-6}$, and $\sigma_a = 0.2$, in other words, I shut down the impact of productivity and assets-in-place. I also set the fix cost for participating in the cross-border asset transactions as $f_F = 0.05$. Figure 3.3 shows how changes in excess profitability affect the quantities of new investment and asset purchases in the foreign market, holding all other variables constant. Firms with lower excess profitability make new investment instead of purchasing existing assets, and the amount of new investment increases as the excess profitability increases. After firms' excess profitability passes a certain threshold, firms start to purchase existing assets in the foreign country, and a nonlinear relationship between the amount of assets purchased and the excess

profitability emerges. Specifically, when the firm's excess profitability increases, the amount of assets bought first increases; as the firm becomes more and more competitive, the amount of assets bought actually starts to decrease after the amount of assets bought reaches a maximum amount.

Figure 3.4 shows firms' decisions in the home country. In this case, all the firms plotted sell their existing assets. As firms' excess profitability increases, they sell fewer existing assets; after the level of excess profitability reaches a threshold, as firms become even more competitive, the amount of assets sold starts to increase.

3.3.2 Regression Analysis on Simulated Data

In this section, I conduct regression analysis using simulated data and report the results. This analysis further sheds light on the relationship between the amount of assets transferred and a firm's characteristics and motivates subsequent analysis using actual data on asset transactions. I set the mean of the log of the productivity as $\bar{z} = \log(0.4)$; the mean of the log of the assets-in-place as $\bar{s} = \log(0.5)$; the mean of the competitiveness proxy as $\bar{a} = 0$; the standard deviations as $\sigma_z = 0.2$, $\sigma_s = 0.4$, and $\sigma_a = 0.2$; the correlation between the firm's competitiveness, productivity, and assets-in-place as $\rho_{as} = 0$, $\rho_{az} = 0$, and $\rho_{sz} = 0.3$; the demand parameter as $\beta = 0.9$; and the fixed costs of investment as $f_D = 0.02$, $f_F = 0.05$, and $f_I = 0.02$. I obtain a sample of 10,000 firms.

I first investigate the sample firms' likelihood of participating in asset transactions in the domestic country. I apply the Logit model to the asset purchasers and sellers separately. I include the firm's competitiveness and productivity as regressors. In order to capture the nonlinear relationship between the likelihood of participating in asset transactions and the firms' competitiveness, I also include the square term of the competitiveness in an alternative

specification. Specifically, I run the following two Logit regressions to analyze the correlation between the likelihood of asset transactions and the firm's characteristics:

$$y_v = \delta_0 + \delta_1 \alpha_v + \delta_3 Z_v + \xi_v,$$
$$y_v = \delta_0 + \delta_1 \alpha_v + \delta_2 (\alpha_v)^2 + \delta_3 Z_v + \xi_v,$$

where y_v is a dummy variable which equals 1 if firm v buys assets on the domestic market; α_v and Z_v are the competitiveness and the productivity of firm v, and ξ_v denotes the idiosyncratic term. I examine the likelihood of asset sales in a similar way.

In Table 3.1, columns (1) and (2) report the results for the simulated data on the sample firms' participation in asset purchases in the domestic country. The coefficients on the competitiveness and its square term are statistically insignificant. The coefficients on the productivity in both specifications are positive and statistically significant, which suggests that more productive firms are more likely to buy assets. Columns (3) and (4) display the results for the sample firms' participation in asset sales in the domestic country. The coefficient on the competitiveness is positive and statistically significant, which suggests that more competitive firms are more likely to sell assets. The coefficient on its square term is negative, which is also consistent with the nonlinear relationship between the assets sold and the firm's excess profitability, as shown in Figure 3.3. The coefficients on the productivity in both specifications are negative and statistically significant, which suggests that more productive firms are less likely to sell assets.

Regarding the sample firms' asset purchases in the foreign country, I apply the Heckman selection model. Column (5) presents the results. In the selection equation, the coefficients on the competitiveness and productivity are positive and statistically significant, which indicates that more competitive or more productive firms are more likely to buy assets in the foreign country. In the investment equation, the negative coefficients on the competitiveness suggests that more competitive firms tend to buy fewer assets in the foreign country, while the positive coefficient

on the productivity suggests that more productive firms tend to buy more assets in the foreign country. The coefficient on the square term of the competitiveness suggests that the negative correlation between the amount of assets purchased and the competitiveness is decreasing as the firm becomes more competitive. This result is also consistent with the nonlinear relationship between the assets purchased and the firm's competitiveness, as shown in Figure 3.4.

3.4 Empirical Analysis

Based on the above analysis, the model develops a number of empirical predictions on the impact of a firm's characteristics, specifically its competitiveness and productivity, on its decisions regarding asset transactions, both in the domestic country and abroad. In this section, I map the theoretical results into empirical strategies and test the model's predictions.

3.4.1 Data and Variables

In this section, I describe the data sources, the screening procedures, and the variables used in the regressions.

3.4.1.1 Data and Sample

Due to the availability of financial data, I focus on the U.S. buyers, or in other words, the buyers are U.S. firms, and the sellers are firms all around the world, including the U.S. firms.

Regarding the asset transaction data, I impose certain searching criteria on the M&A database recorded by SDC to identify asset sales. Borisova, John, and Salotti (2011) use Thomson ONE Banker's Deals Analysis module to identify cross-border asset sales, which has the same data coverage as SDC.[10] Warusawitharana (2008) also uses SDC to collect data on asset sales when studying domestic deals. The domestic asset transactions in my analysis meet the following

[10]SDC and Thomson ONE Banker both belong to Thomson Financials Corporation.

criteria: the deal is announced between January 1, 2001 and December 31, 2009, and is completed by the end of the sample period; to reduce measurement errors, the deal value must be at least 1 million U.S. dollars; the deal attitude is "Friendly". Following the standard literature, I exclude leveraged buyouts, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, and privatizations from the sample. In addition, deals in which the target or the acquirer is a government agency are excluded from the sample.[11] I also exclude asset sales due to bankruptcy, because the reasons for asset sales under bankruptcy are different from those of firms in good standing (Ofek, 1993). I further exclude deals involving financial industries (Standard Industrial Classification (SIC) codes 6000-6799). As to cross-border asset transactions, after the deal is identified by the cross-border deal flag of SDC, I further impose the restriction that the deals involve target firms which are not located in the U.S.

Regarding the firms' financial data, I collect the annual data from Compustat. I then link the firms' financial data to their asset transaction data using each firm's CUSIP and the year.

3.4.1.2 Variables

In this section, I outline the variables used in the empirical analysis. The definitions and data sources of the variables are detailed in Table 3.A.1, and summary statistics are reported in Table 3.A.2.

To measure a firm's competitiveness, I use its excess price cost margin. I first calculate each firm's price cost margin, which is defined as its EBITDA (earnings before interest, taxes, and depreciation) scaled by its total sales. I then compute the equally weighted average of the price

[11]Karolyi and Liao (2010) investigate cross-border acquisitions led by government-controlled acquirers from 1990 to 2008, using corporate-led acquisitions as a benchmark.

cost margin for each two-digit SIC sector. The difference between each firm's price cost margin and this sector average is the firm's excess cost margin.

Regarding the firm's productivity, I use the return on assets of each firm, which equals its EBITDA scaled by its book value of assets. As an alternative to the return on assets, I use the return per employee, which is defined as the EBITDA scaled by the total number of employees.

Following the standard literature, I also control the size of the firm. I first take the log of the firm's book value of assets; in order to detrend the assets, I then take the difference of the log values between two fiscal years. Moreover, as the firm's valuation may be correlated with its asset transactions due to the wealth effect, I control the firm's market-to-book ratio in the regressions which equals the ratio of the market value of equity to the book value of equity.

3.4.2 Empirical Results

At the firm level, I analyze how firms' heterogeneity in their competitiveness and productivity are associated with their asset transaction activities.

3.4.2.1 Asset Purchases in the Domestic Country

Discrete choice models provide methodologies to analyze the characteristics of asset buyers and sellers. Regarding firms' asset transactions in the home country, I estimate the following Logit regression to analyze the firms' decisions to participate in domestic asset transfers:

$$y_{v,t}^{P} = \theta_0 + \theta_1 \alpha_{v,t} + \theta_2 \left(\alpha_{v,t}\right)^2 + \theta_3 Z_{v,t} + \theta_4 R_{v,t} + t + e_{v,t},$$

where $y_{v,t}^{P}$ is a dummy variable. If firm v of the U.S. buys existing assets from another domestic firm in year t, $y_{v,t}^{P} = 1$; otherwise, $y_{v,t}^{P} = 0$. $\alpha_{v,t}$ and $Z_{v,t}$ stand for the competitiveness and the productivity. $R_{v,t}$ is a vector of control variables, and t is the year dummy.

Table 3.2 reports the results for the U.S. firms' asset purchase decisions in the domestic country, and it also reports the odds ratios corresponding to the parameter estimates. The odds ratios represent the relative increase in the odds in favor of an asset purchase relative to not purchasing assets for a unit increase in the independent variable. Standard errors are clustered by the acquirer firm to relax the assumption of independence within each cluster. Column (1) presents the baseline regressions. The coefficient on the competitiveness is positive but statistically insignificant, while that on the productivity is positive and statistically significant. This result indicates that productive firms are more likely to buy assets on the home market, but firms' competitiveness may not be correlated to their asset purchase decisions on the home market. This result is consistent with those from the simulated data. The coefficient on the firm's size is positive and statistically significant, which implies that growing firms are more likely to purchase assets in the home country. Regarding the economic magnitude of the coefficient estimates, as indicated by the result in column (1), if the return on assets increases by one standard deviation, the odds of being an asset purchaser are expected increase by about 12.11%.

In column (2), I use the return per employee as an alternative measure for the return on assets, and the results are similar to those in column (1). In columns (3) and (4), I control for the market-to-book ratio. As the data on the market-to-book ratio are only available for recent years, the sample size shrinks. The coefficients on the return on assets and return per employee are still statistically significant while the coefficient on the market-to-book ratio is positive and statistically insignificant.

In order to investigate whether there is a nonlinear relationship between the decision to purchase assets and the firm's competitiveness, I include in Table 3.3 the square term of the competitiveness and conduct similar exercises as those in Table 3.2. Across all the specifications, the coefficient estimates on the competitiveness and its square term are positive and statistically

insignificant. The coefficient estimates on the return on assets or return per employee are positive and statistically significant although the magnitudes are smaller. The coefficients on the firm's size remains positive and statistically significant, while those on the market-to-book ratio are still statistically insignificant.

3.4.2.2 Asset Sales in the Domestic Country

Similarly, I investigate the firms' asset sales decisions in the home country. Specifically, I estimate the following Logit regression to analyze the U.S. firms' decisions to sell assets on the domestic market:

$$y_{v,t}^{S} = \eta_0 + \eta_1 \alpha_{v,t} + \eta_2 \left(\alpha_{v,t}\right)^2 + \eta_3 Z_{v,t} + \eta_4 R_{v,t} + t + \varepsilon_{v,t},$$

where $y_{v,t}^{S}$ is a dummy variable. If firm v of the U.S. sells its assets to another firm in year t, $y_{v,t}^{S} = 1$; otherwise, $y_{v,t}^{S} = 0$. $\alpha_{v,t}$, $Z_{v,t}$, $R_{v,t}$, and t stand for the same meaning as in the asset purchases regression.

Table 3.4 reports the results for the U.S. firms' asset sales decisions in the domestic country. Column (1) presents the baseline regression. The coefficient on the competitiveness is positive and statistically significant, which indicates that other things being equal, competitive firms are more likely to sell assets. The coefficient on the productivity is negative and statistically significant, which suggests that productive firms are less likely to sell assets on the home market. These results match the findings from the simulated data reported in column (3) of Table 3.2. Regarding the economic magnitude of the coefficient estimates, if the excess price cost margin increases by one standard deviation, the odds of being an asset seller are expected to increase by about 6.62%. A unit standard deviation increase in return on assets decreases the odds in favor of the asset sales by 27.59%. The coefficient on the firm's size is positive and statistically significant, which implies that large firms are more likely to sell assets in the home country.

In column (2), I use the return per employee as an alternative measure for the return on assets; the results are similar to those in column (1). If the return per employee increases by one standard deviation, the odds of being an asset seller are expected to decrease by about 28.47%. In columns (3) and (4), I control for the market-to-book ratio. The coefficients on return on assets and return per employee remain statistically significant while the coefficient on the market-to-book ratio is positive and statistically insignificant.

In order to investigate whether there is a nonlinear relationship between the decision to sell asset and the firm's competitiveness, in Table 3.5, I include the square term of the competitiveness and conduct similar exercises as those in Table 3.4. Across all the specifications, the coefficient estimate on the competitiveness is positive and statistically significant. The coefficient on its square term is negative and statistically significant, which matches the result from the simulated data. This finding indicates that the effect of the competitiveness on the likelihood of selling assets in the home country is decreasing. The coefficient estimates on the return on assets or return per employee remain negative and statistically significant and the magnitudes are similar to the corresponding regressions in Table 3.4. The coefficients on the firm's size remains positive and statistically significant, while those on market-to-book ratio are still positive and statistically insignificant.

3.4.2.3 Asset Purchases Overseas

Regarding the firms' asset purchases overseas, I estimate the Heckman selection model

$$y_{v,t}^{O} = \gamma_0 + \gamma_1 \alpha_{v,t} + \gamma_2 \left(\alpha_{v,t}\right)^2 + \gamma_3 Z_{v,t} + \gamma_4 R_{v,t} + t + u_{1v,t},$$

$$y_{v,t}^{O} > 0,\ \delta_1 \alpha_{v,t} + \delta_2 Z_{v,t} + \delta_3 R_{v,t} + u_{2v,t} > 0,$$

where $y_{v,t}^{O}$ is the amount of assets purchased by a U.S. firm from a firm in a foreign country. If firm v buys assets in country j in year t, then $y_{v,t}^{O} > 0$; otherwise, $y_{v,t}^{O}$ is not observable. $\alpha_{v,t}$, $Z_{v,t}$, $R_{v,t}$, and t stand for the same meaning as before. This two-step approach first estimates the

selection equation and then estimates the investment equation. The amount of asset purchases in the foreign country is measured by the transaction values of each cross-border deal reported by SDC.

Table 3.6 reports the results for the U.S. firms' asset purchase decisions in foreign countries. Table 3.1 column (5) provides the simulation counterpart. Table 3.6 column (1) presents the baseline regression. In the selection equation, the coefficient on the competitiveness is positive and statistically significant, which indicates that competitive firms are more likely to purchase assets abroad. Similarly, the positive coefficient estimate for the productivity suggest that other things being equal, productive firms are more likely to purchase assets abroad. The coefficient on the firm's size is positive and statistically significant, which implies that large firms are more likely to buy assets in the foreign country. If the excess price cost margin increases by one standard deviation, the odds of purchasing assets in the foreign country are expected to increase by about 16.78%. A unit standard deviation increase in return on assets increases the odds in favor of the asset purchases in the foreign country by 17.57%. In the investment equation, the coefficient on the competitiveness is negative and statistically significant, which indicates that other things being equal, competitive firms are less likely to purchase assets overseas. The coefficient on the square term of the competitiveness is positive and statistically insignificant. The coefficient on the return on assets is positive and statistically insignificant.

In column (2), I use the return per employee as an alternative measure for the return on assets; the results are similar to those in column (1). In the investment equation, the coefficient on the return per employee is positive and statistically significant. If the return per employee increases by one standard deviation, the amount of assets purchased overseas increases by about 0.12 units of standard deviation. In columns (3) and (4), I control for the market-to-book ratio. The coefficient on the competitiveness is negative and statistically significant, and those on return on

assets and return per employee remain statistically significant. In column (3), in the selection equation, the coefficient on the market-to-book ratio is positive and statistically significant, which indicates that firms with high market-to-book ratio are more likely to purchase assets on the foreign market. In contrast, in the investment equation, the coefficient on the market-to-book ratio is positive and statistically insignificant, which suggests that the market-to-book ratio may not be correlated with the amount of assets purchased in the foreign country.

3.5 Conclusion

Cross-border asset transactions have increased dramatically and firms are facing competition from foreign firms entering the local market. Based on these new developments, this paper incorporates the world market for corporate assets and analyzes the firms' asset transactions both in the domestic country and abroad. I introduce a new characteristic of the firm, namely, the competitiveness in the product market, which is measured by the excess profitability and investigate how the competitiveness and productivity affects the firm's investment decisions. I show that, other things being equal, firms with high competitiveness are more likely to buy assets on the overseas markets, and that they are more likely to sell assets on the domestic market. Firms with high productivity are more likely to buy assets on both the domestic and overseas markets, and they are less likely to sell assets on the domestic market, which mirrors the established results regarding the firm's productivity.

Using the comprehensive data on the asset purchases and sales of the U.S. firms in the domestic country and overseas, this paper finds empirical evidence which supports the model's implications. In particular, the competitiveness and productivity of the firm predict the likelihood that a firm purchases assets overseas. If the excess price cost margin increases by one standard deviation, the odds of purchasing assets in the foreign country are expected to increase by about 16.78%. A unit standard deviation increase in the return on assets increases the likelihood of

asset purchases in the foreign country by 17.57%.

The findings in this paper add to the research on the impact of the product market competition on firms' activities. It also extends the studies on asset transactions to an open economy setting. Future research on how the financing considerations influence the firms' asset purchase and sales decisions worldwide could prove fruitful, as they have impact on firms' asset sales in the domestic country (Lang, Poulsen, and Stulz, 1995; Warusawitharana, 2008). Given the findings on value losses or creation in M&As (Moeller, Schlingemann, Stulz, 2005; Chari, Ouimet, and Tesar, 2010) and asset sales (Borisova, John, and Salotti, 2011), it could also be interesting to incorporate the product market competition and explore the links between a firm's valuation and its asset purchases and sales worldwide.

APPENDIX

A. Firm's Profit Maximization Problem

In this appendix, I characterize the solutions to the firm's profit maximization problems in the home country and the foreign country.

A1. Profit Maximization in the Home Country

As shown in section 3.2.2.1, in the home country, depending on whether to participate in the domestic asset transaction market, the firm has two options: (1) non-participation $(X_{ii} = 0)$, and (2) participation $(X_{ii} \neq 0)$. The firm's decisions are detailed below.

Case 1. Non-participation $(X_{ii} = 0)$

In this case, there are two scenarios.

Scenario (a). In this scenario, the firm maintains its assets-in-place inherited from the last period, neither making new investment nor purchasing existing assets from or selling its assets to other firms. The firm's decision is characterized by the following expressions:

$$I_{ii}^* = 0,\ X_{ii}^* = 0,\ p_{ii}^* = \beta S_i^{-(1-\alpha)} Z_i^{-(1-\alpha)},\ Y_{ii}^* = Z_i S_i. \tag{3.4}$$

And the restriction on the parameter values $(\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}} < S_i$ needs to be satisfied in equilibrium.

Scenario (b). In this scenario, the firm makes new investment using its assets-in-place inherited from the last period, instead of purchasing existing assets from or selling its assets to other firms. The firm's decision is characterized by the following expressions:

$$I_{ii}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}} - S_i,\ X_{ii}^* = 0,\ p_{ii}^* = \frac{1}{\alpha Z_i},\ Y_{ii}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{1}{1-\alpha}}. \tag{3.5}$$

And the restriction on the parameter values $(\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}} \geq S_i$ needs to be satisfied in equilibrium.

Case 2. Participation $\left(X_{ii} \neq 0 \text{ if } q_i < 1\right)$

In this case, the firm purchases or sells assets on the domestic asset market, and the equilibrium is characterized by the following expressions:

$$I_{ii}^* = 0,\ X_{ii}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}} q_i^{-\frac{1}{1-\alpha}} - S_i,\ p_{ii}^* = \frac{q_i}{\alpha Z_i},\ Y_{ii}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{1}{1-\alpha}} q_i^{-\frac{1}{1-\alpha}}. \tag{3.6}$$

The firm compares the profits in these two cases and makes the decision in its home country. Specifically, the maximum amount of profits from the production in the home country is

$$\pi_{ii}^* = \max\left\{\pi_{X_{ii}=0}, \pi_{X_{ii}\neq 0}\right\}, \tag{3.7}$$

where $\pi_{X_{ii}=0} = p_{ii}^* Y_{ii}^* - I_{ii}^*$ and $\pi_{X_{ii}\neq 0} = p_{ii}^* Y_{ii}^* - \left(q_i X_{ii}^* + f_D\right)$.

A2. Profit Maximization Overseas

As shown in section 2.2.2, in the foreign country, the firm has two options: (1) non-participation $(X_{ij} = 0)$, and (2) participation $\left(X_{ij} > 0\right)$. The firm's decisions are detailed below.

Case 1. Non-participation $(X_{ij} = 0)$

In this case, the firm makes new investment instead of purchasing existing assets from foreign firms. The equilibrium is characterized by the following expressions:

$$I_{ij}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}},\ X_{ij}^* = 0,\ p_{ij}^* = \frac{1}{\alpha Z_i},\ Y_{ij}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{1}{1-\alpha}}, \tag{3.8}$$

and the maximum profit obtained in the foreign country is $\pi_{X_{ij}=0} = p_{ij}^* Y_{ij}^* - \left(I_{ij}^* + f_I\right)$.

Case 2. Participation $\left(X_{ij} > 0 \text{ if } q_j < 1\right)$

In this case, instead of making new investment, the firm purchases existing assets from foreign firms; the equilibrium is characterized by the following expressions:

$$I_{ij}^* = 0,\ X_{ij}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{\alpha}{1-\alpha}} q_j^{-\frac{1}{1-\alpha}},\ p_{ij}^* = \frac{q_j}{\alpha Z_i},\ Y_{ij}^* = (\beta\alpha)^{\frac{1}{1-\alpha}} Z_i^{\frac{1}{1-\alpha}} q_j^{-\frac{1}{1-\alpha}}, \tag{3.9}$$

and the maximum profit obtained in the foreign country is $\pi_{X_{ij}\neq 0} = p_{ij}^* Y_{ij}^* - \left(q_j X_{ij}^* + f_F + f_I\right)$.

When the profit obtained from country *j* is positive, the firm enters country j. Depending on the amount of profit, the firm either makes new investment or purchases existing assets on the asset market in country j. The firm compares the profits in these two cases and determines its amount of investment in country j. The maximum amount of profit from the production in country j is

$$\pi_{ij}^* = \max\left\{\pi_{X_{ij}=0}, \pi_{X_{ij}\neq 0}\right\}, \tag{3.10}$$

where $\pi_{X_{ij}=0} = p_{ij}^* Y_{ij}^* - \left(I_{ij}^* + f_I\right)$ and $\pi_{X_{ij}\neq 0} = p_{ij}^* Y_{ij}^* - \left(q_j X_{ij}^* + f_F + f_I\right)$.

B. Numerical Algorithm

This appendix describes the algorithm of computing the equilibrium. The steps are summarized as follows.

Step 0: Define the finite grid for the equilibrium price q over $(0,1)$. Define the finite grids for a, s, and z over the interval of 3 standard deviations centering around the corresponding means: $\bar{a}$, $\bar{s}$, $\bar{z}$, respectively.

Step 1: Solve each firm's profit maximization problem in the domestic country, use equations (3.4), (3.5), and (3.6) to compute I_{ii}, X_{ii}, p_{ii}, and Y_{ii}. Use equation (3.7) to compute π_{ii}.

Step 2: Solve each firm's profit maximization problem in the foreign country, use equations (3.8) and (3.9) to compute I_{ij}, X_{ij}, p_{ij}, and Y_{ij}. Use equation (3.10) to compute π_{ij}.

Step 3: Given the joint distribution of a, s, and z, as defined in expression (3.3), compute the aggregate excess demand for the existing assets.

Step 4: Apply the grid search method, use the market clearing condition, equation (3.2), to solve the equilibrium price q^* of existing assets. First, find the minimum value of the excess demand, exd_1, and its corresponding value of q, q_1. Then, determine the value of q satisfying the following two conditions: (1) it has the closest grid index to q_1; (2) it corresponds to the value of excess demand which has the opposite sign to exd_1. Denote this value of q as q_0. Define a finite grid for q over $[q_0, q_1]$. Repeat Steps 1 to 3 and find the minimum value of the excess demand, exd, and its corresponding value of q. This value of q is the equilibrium price q^*.

Step 5: Use q^* and equations (3.4), (3.5), and (3.6) to compute I_{ii}^* and X_{ii}^*; use q^* and equations (3.8) and (3.9) to compute I_{ij}^* and X_{ij}^*.

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Figure 3.1
Firms' investment decisions overseas.
This figure plots how firms' overseas investment decisions vary with changes in the productivity and the degree of competitiveness. The exogenous parameters are specified as follows. $\bar{z} = \log(0.5)$; $\sigma_z = 0.2$; $\bar{s} = \log(0.5)$; $\sigma_s = 0.2$; $\bar{a} = 0$; $\sigma_a = 0.2$; $\rho_{zs} = 0$; $\rho_{sa} = 0$; $\rho_{za} = 0$; $\beta = 1$; $f_D = 0.02$; $f_F = 0.02$; $f_I = 0.02$; and $N = 2$. The equilibrium price of existing assets is $q^* = 0.729$.

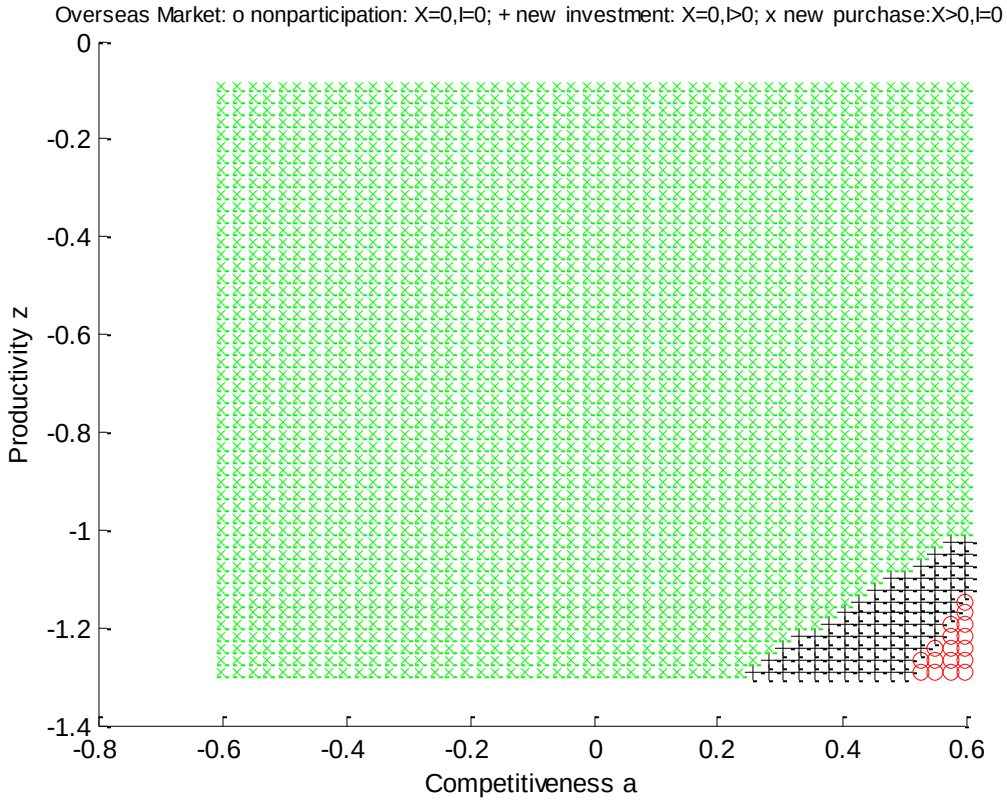


Figure 3.2
Firms' investment decisions in the domestic country: $s = \bar{s}$.
This figure plots how firms' investment decisions in the domestic country vary with changes in the productivity and the degree of competitiveness when the assets-in-place is fixed at the mean value $\bar{s}$. The exogenous parameters are specified as follows. $\bar{z} = \log(0.5)$; $\sigma_z = 0.2$; $\bar{s} = \log(0.5)$; $\sigma_s = 0.2$; $\bar{a} = 0$; $\sigma_a = 0.2$; $\rho_{zs} = 0$; $\rho_{sa} = 0$; $\rho_{za} = 0$; $\beta = 1$; $f_D = 0.02$; $f_F = 0.02$; $f_I = 0.02$; and $N = 2$. The equilibrium price of existing assets is $q^* = 0.729$.

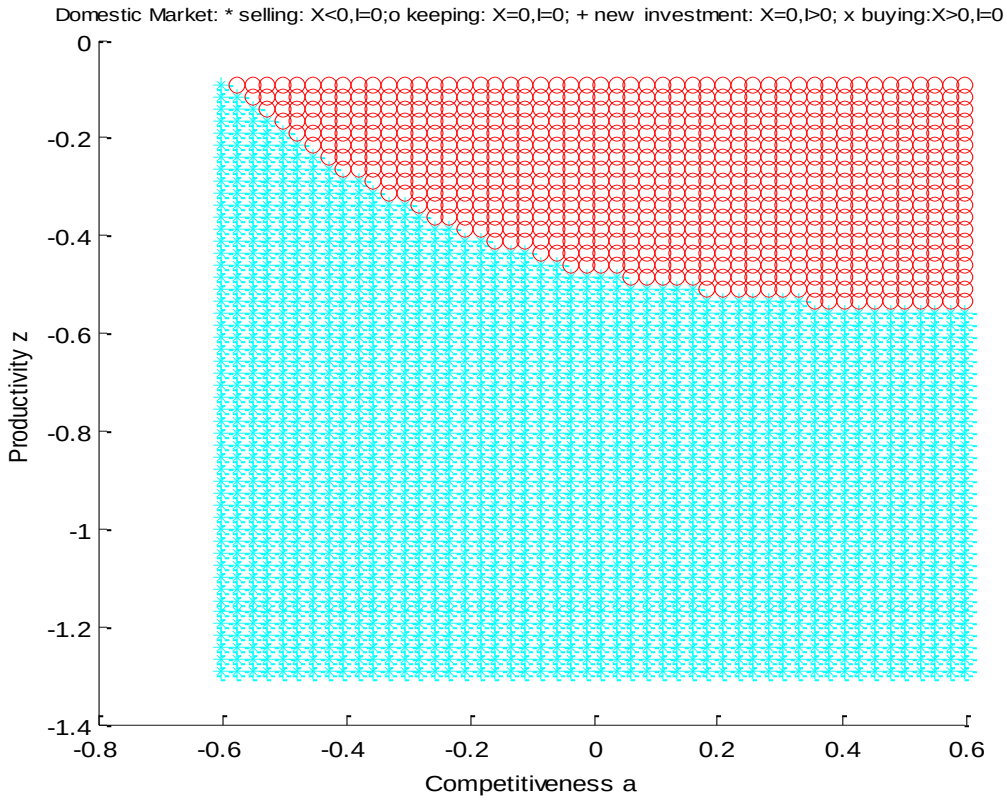


Figure 3.3
Equilibrium quantity of investment: in the home country.
This figure plots how firms' investment in the domestic country varies with changes in their competitiveness. The exogenous parameters are specified as follows. $\bar{z} = \log(0.5)$; $\sigma_z = 10^{-6}$; $\bar{s} = \log(0.5)$; $\sigma_s = 10^{-6}$; $\bar{a} = 0$; $\sigma_a = 0.2$; $\rho_{zs} = 0$; $\rho_{sa} = 0$; $\rho_{za} = 0$; $\beta = 1$; $f_D = 0.02$; $f_F = 0.05$; $f_I = 0.02$; and $N = 2$. The equilibrium price of existing assets is $q^* = 0.694$. "X-domestic" is the quantity of assets transferred in the domestic country, and "I-domestic" is the quantity of new investment in the domestic country.

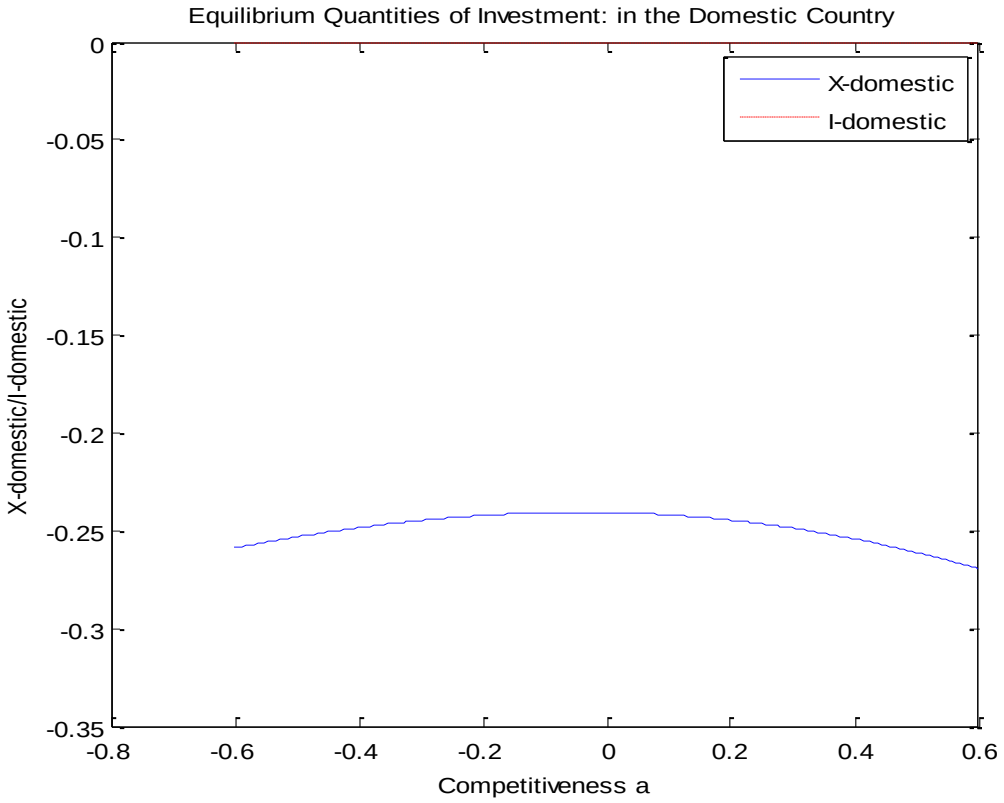


Figure 3.4
Equilibrium quantity of investment: in the foreign country.
This figure plots how firms' investment varies with changes in their competitiveness when they invest in the foreign country. The exogenous parameters are specified as follows. $\bar{z} = \log(0.5)$; $\sigma_z = 10^{-6}$; $\bar{s} = \log(0.5)$; $\sigma_s = 10^{-6}$; $\bar{a} = 0$; $\sigma_a = 0.2$; $\rho_{zs} = 0$; $\rho_{sa} = 0$; $\rho_{za} = 0$; $\beta = 1$; $f_D = 0.02$; $f_F = 0.05$; $f_I = 0.02$; and $N = 2$. The equilibrium price of existing assets is $q^* = 0.694$. "X-foreign" is the quantity of assets purchased in the foreign country, and "I-foreign" is the quantity of new investment in the foreign country.

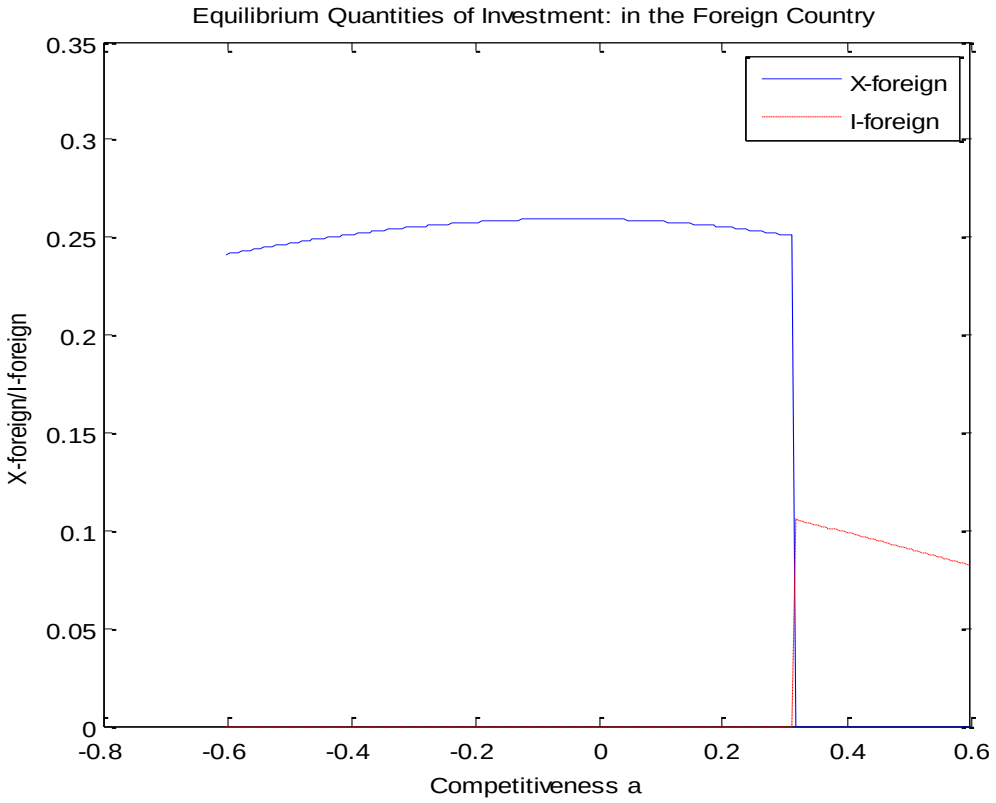


Table 3.1

Regressions on the simulated data.

This table reports the regression results of the simulated data. The exogenous parameters are specified as follows. $\bar{z} = \log(0.4)$; $\sigma_z = 0.2$; $\bar{s} = \log(0.5)$; $\sigma_s = 0.4$; $\bar{a} = 0$; $\sigma_a = 0.2$; $\rho_{zs} = 0.3$; $\rho_{sa} = 0$; $\rho_{za} = 0$; $\beta = 0.9$; $f_D = 0.02$; $f_F = 0.05$; $f_I = 0.02$; and $N = 2$. The equilibrium price of existing assets is $q^* = 0.562$. Regressions (1) and (2) report the results of the Logit regression where the dependent variable is the amount of assets purchased by the sample firms in the domestic country. Regressions (3) and (4) are the Logit regressions where the dependent variable is the amount of assets sold by the sample firms in the domestic country. Regression (5) reports the result of the Heckman selection model for the asset purchases in the foreign country. In the Heckman selection model, the number of uncensored observation is reported. Standard errors are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1 %, 5%, and 10% levels, respectively.

	Asset purchases in the domestic country		Asset sales in the domestic country		Asset purchases in the foreign country
	(1)	(2)	(3)	(4)	(5)
Investment equation					
Competitiveness	0.6152	-17.1446	1.6270***	-8.4549	-0.2687***
	(0.7965)	(12.3604)	(0.4291)	(6.2869)	(0.0307)
Competitiveness Squared		-17.7710		-10.1033*	-0.3072***
		(12.3404)		(6.2867)	(0.0312)
Productivity	5.3994***	5.4005***	-2.6729***	-2.6778***	0.6182***
	(0.3611)	(0.3613)	(0.2166)	(0.2167)	(0.0013)
Constant	-4.4348***	-8.8305***	2.0744***	-0.4139	-0.0482***
	(0.4511)	(3.0892)	(0.2461)	(1.5670)	(0.0075)
Selection equation					
Competitiveness					430.5858***
					(57.6309)
Productivity					522.2255***
					(72.7802)
Number of Observations	5584	5584	9208	9208	8417
Pseudo R^2	0.0507	0.0512	0.0132	0.0134	-

Table 3.2

Logit regressions: domestic asset purchases.

This table reports results from Logit regressions of domestic asset purchases, competitiveness, productivity, and other control variables. The dependent variable is a dummy variable, which equals 1 if the firm purchases assets on the domestic market, and 0 otherwise. Variable definitions and data sources are as described in Table 3.A.1, and summary statistics are reported in Table 3.A.2. Standard errors robust to heteroskedasticity and clustered by the acquirer firm are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Competitiveness	0.0002	1.0002	0.0014	1.0014	0.0011	1.0011	0.0004	1.0004
	(0.0005)	(0.0005)	(0.0009)	(0.0009)	(0.0007)	(0.0007)	(0.0005)	(0.0005)
Return on assets	0.5841**	1.7934**			1.5435***	4.6808***		
	(0.2549)	(0.4572)			(0.1039)	(0.4863)		
Return per employee			0.0027***	1.0027***			0.0034***	1.0034***
			(0.0002)	(0.0002)			(0.0002)	(0.0002)
Size	0.4272***	1.5329***	0.4670***	1.5952***	0.3981***	1.4890***	0.4021***	1.4950***
	(0.0196)	(0.0300)	(0.0187)	(0.0298)	(0.0243)	(0.0361)	(0.0240)	(0.0359)
Market-to-book					0.0002	1.0002	0.0002	1.0002
					(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	118636	118636	110798	110798	48585	48585	46721	46721
Pseudo R^2	0.0375	0.0375	0.0367	0.0367	0.0324	0.0324	0.0284	0.0284

Table 3.3

Logit regressions: domestic asset purchases with quadratic competitiveness.

This table reports results from Logit regressions of domestic asset purchases, competitiveness, productivity, and other control variables. The dependent variable is a dummy variable, which equals 1 if the firm purchases assets on the domestic market, and 0 otherwise. Variable definitions and data sources are as described in Table 3.A.1, and summary statistics are reported in Table 3.A.2. Standard errors robust to heteroskedasticity and clustered by the acquirer firm are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Competitiveness	0.0007	1.0007	0.0023	1.0023	0.0001	1.0001	0.0001	1.0001
	(0.0010)	(0.0010)	(0.0015)	(0.0015)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Competitiveness squared	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Return on assets	0.1162***	1.1232***			0.2304***	1.2591***		
	(0.0307)	(0.0345)			(0.0593)	(0.0747)		
Return per employee			0.0001**	1.0001**			0.0004**	1.0004**
			(3.93e-05)	(3.93e-05)			(0.0002)	(0.0002)
Size	0.2665***	1.3054***	0.5575***	1.7464***	0.2778***	1.3202***	0.2779***	1.3204***
	(0.0067)	(0.0088)	(0.0183)	(0.0319)	(0.0088)	(0.0116)	(0.0084)	(0.0111)
Market-to-book					-2.04e-05	1.0000	-2.02e-05	1.0000
					(2.70e-05)	(2.70e-05)	(2.68e-5)	(2.68e-05)
Observations	118636	118636	110798	110798	48585	48585	46721	46721
Pseudo R^2	0.0805	0.0805	0.0381	0.0381	0.0687	0.0687	0.0658	0.0658

Table 3.4

Logit regressions: domestic asset sales.

This table reports results from Logit regressions of domestic asset sales, competitiveness, productivity, and other control variables. The dependent variable is a dummy variable, which equals 1 if the firm sells assets on the domestic market, and 0 otherwise. Variable definitions and data sources are as described in Table 3.A.1, and summary statistics are reported in Table 3.A.2. Standard errors robust to heteroskedasticity and clustered by the acquirer firm are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Competitiveness	0.0247***	1.0250***	0.0268***	1.0271***	0.0015	1.0015	0.0097	1.0098
	(0.0077)	(0.0079)	(0.0078)	(0.0080)	(0.0112)	(0.0112)	(0.0115)	(0.0116)
Return on assets	-1.6492***	0.1922***			-2.2590***	0.1045***		
	(0.1310)	(0.0252)			(0.2352)	(0.0246)		
Return per employee			-0.0073***	0.9927***			-0.0067***	0.9933***
			(0.0006)	(0.0006)			(0.0009)	(0.0009)
Size	0.2847***	1.3294***	0.2777***	1.3201***	0.3297***	1.3906***	0.2787***	1.3214***
	(0.0115)	(0.0153)	(0.0117)	(0.0155)	(0.0238)	(0.0331)	(0.0215)	(0.0284)
Market-to-book					0.0076	1.0077	0.0063	1.0064
					(0.0153)	(0.0155)	(0.0162)	(0.0163)
Observations	137103	137103	125074	125074	51662	51662	49840	49840
Pseudo R^2	0.0433	0.0433	0.0439	0.0439	0.0443	0.0443	0.0398	0.0398

Table 3.5

Logit regressions: domestic asset sales with quadratic competitiveness.

This table reports results from Logit regressions of domestic asset sales, competitiveness, productivity, and other control variables. The dependent variable is a dummy variable, which equals 1 if the firm sells assets on the domestic market, and 0 otherwise. Variable definitions and data sources are as described in Table 3.A.1, and summary statistics are reported in Table 3.A.2. Standard errors robust to heteroskedasticity and clustered by the acquirer firm are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Competitiveness	0.1301***	1.1390***	0.1380***	1.1479***	0.1155***	1.1224***	0.1221***	1.1299***
	(0.0289)	(0.0329)	(0.0292)	(0.0335)	(0.0443)	(0.0497)	(0.0452)	(0.0510)
Competitiveness squared	-0.0149***	0.9852***	-0.0157***	0.9844***	-0.0156***	0.9845***	-0.0153***	0.9848***
	(0.0039)	(0.0038)	(0.0039)	(0.0038)	(0.0058)	(0.0057)	(0.0059)	(0.0058)
Return on assets	-1.7092***	0.1810***			-2.3134***	0.0989***		
	(0.1321)	(0.0239)			(0.2376)	(0.0235)		
Return per employee			-0.0075***	0.9925***			-0.0069***	0.9931***
			(0.0006)	(0.0006)			(0.0009)	(0.0009)
Size	0.2893***	1.3355***	0.2823***	1.3262***	0.3340***	1.3965***	0.2825***	1.3265***
	(0.0116)	(0.0155)	(0.0118)	(0.0156)	(0.0240)	(0.0336)	(0.0216)	(0.0287)
Market-to-book					0.0060	1.0060	0.0046	1.0046
					(0.0154)	(0.0155)	(0.0163)	(0.0163)
Observations	137103	137103	125074	125074	51662	51662	49840	49840
Pseudo R^2	0.0438	0.0438	0.0445	0.0445	0.0451	0.0451	0.0405	0.0405

Table 3.6

Heckman selection model: cross-border asset purchases with quadratic competitiveness.

This table reports results from Heckman selection model: cross-border asset purchases. The dependent variable is the amount of assets purchased in a foreign country by a firm in a year. Variable definitions and data sources are as described in Table 3.A.1, and summary statistics are reported in Table 3.A.2. The table reports the number of uncensored observations. Standard errors robust to heteroskedasticity and clustered by the acquirer firm are reported in parentheses below regression coefficients, and ***, **,* indicate statistical significance at the1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Investment equation				
Competitiveness	-18.9784**	-15.1517**	-35.6427**	-28.0346***
	(9.3887)	(6.5353)	(14.9104)	(9.6751)
Competitiveness squared	1.0903	0.9011	1.7575	1.3873*
	(0.8435)	(0.6638)	(1.2114)	(0.8347)
Return on assets	72.6844		41.8668	
	(49.1422)		(66.9040)	
Return per employee		0.6241***		0.6725***
		(0.1187)		(0.1836)
Market-to-book			2.3913	-1.1871
			(5.2656)	(4.4455)
Selection equation				
Competitiveness	0.0693***	0.0636***	0.0476***	0.0450***
	(0.0038)	(0.0038)	(0.0042)	(0.0041)
Return on assets	1.2827***		1.2700***	
	(0.1094)		(0.1305)	
Return per employee		0.0008***		0.0005***
		(0.0001)		(0.0002)
Size	0.4395***	0.4978***	0.3437***	0.4162***
	(0.0334)	(0.0305)	(0.0479)	(0.0451)
Market-to-book			0.0682***	0.0654***
			(0.0065)	(0.0061)
Observations	3037	3080	1944	1922

Table 3.A.1

Variable definitions and data sources.

This table describes the definitions and data sources of all the variables used in the regressions.

Variable	Definition
Asset Purchases in the Domestic Country	Dummy variable which equals 1 if a firm purchases assets in the domestic country and 0 otherwise. (Source: SDC)
Asset Sales in the Domestic Country	Dummy variable which equals 1 if a firm sells assets in the domestic country and 0 otherwise. (Source: SDC)
Amount of Assets Purchased in the Foreign Country	Transaction values of a cross-border deal with a U.S. firm as the acquirer and a non-U.S. firm as the target (Source: SDC)
Excess Price Cost Margin	The difference between the price cost margin of a firm and that of the two-digit SIC sector which this firm belongs to. A firm's price cost margin is defined as its EBITDA scaled by its total sales. The price cost margin of a two-digit SIC sector is the equally weighted average of the price cost margin of each firm in this two-digit SIC sector. (Source: Compustat)
Return on Assets	A firm's EBITDA scaled by its book value of assets. (Source: Compustat)
Return per Employee	A firm's EBITDA scaled by its total number of employees. (Source: Compustat)
Market-to-book	The ratio of the market value of equity to the book value of equity. (Source: Compustat)
Size	The difference of the log values of a firm's book value of assets between fiscal year t and fiscal year t-1. (Source: Compustat)

Table 3.A.2

Summary statistics.

This table reports summary statistics for the variables used in the regressions. Variable definitions are described in Table 3.A.1.

Variable	Mean	Standard Deviation	Min	Max	Observations
	Panel A: Domestic Country				
Asset Purchases in the Domestic Country	0.0913	0.2881	0	1	153354
Asset Sales in the Domestic Country	0.0237	0.1523	0	1	142740
Excess Price Cost Margin	2.0274	2.5956	-0.0475	7.6683	151144
Return on assets	0.0256	0.1957	-0.4166	0.2266	156237
Return per employee	8.2353	46.0436	-88.3333	82.3240	142020
Market-to-book	2.3805	2.2866	-0.4358	7.2329	62577
Size	0.0897	0.2520	-0.2875	0.5901	140131
	Panel B: Overseas				
Amount of Assets Purchased in the Foreign Country	148.0981	607.0350	1.0000	17639.9700	3788
Excess Price Cost Margin	2.2411	7.3837	-27.8620	49.0483	182478
Return on assets	-0.0649	0.6210	-4.5292	0.4552	187925
Return per employee	16.6121	49.2810	-77.2000	103.2086	164736
Market-to-book	2.2412	2.0108	-0.1309	6.5854	77033
Size	0.0889	0.2326	-0.2650	0.5461	168101

Table 3.A.3
Selected indicators of FDI and international production, 1990–2010.

Item	Value at current prices (Billions of dollars)					Annual growth rate or change on return (Per cent)				
	1990	2005–2007 average	2008	2009	2010	1991–1995	1996–2000	2001–2005	2009	2010
FDI inflows	207	1 472	1 744	1 185	1 244	22.5	40.1	5.3	-32.1	4.9
FDI outflows	241	1 487	1 911	1 171	1 323	16.9	36.3	9.1	-38.7	13.1
FDI inward stock	2 081	14 407	15 295	17 950	19 141	9.4	18.8	13.4	17.4	6.6
FDI outward stock	2 094	15 705	15 988	19 197	20 408	11.9	18.3	14.7	20.1	6.3
Income on inward FDI	75	990	1 066	945	1 137	35.1	13.1	32.0	-11.3	20.3
Rate of return on inward FDI [a]	*6.6*	*5.9*	*7.3*	*7.0*	*7.3*	*-0.5*	-	*0.1*	*-0.3*	*0.3*
Income on outward FDI [a]	122	1 083	1 113	1 037	1 251	19.9	10.1	31.3	-6.8	20.6
Rate of return on outward FDI [a]	*7.3*	*6.2*	*7.0*	*6.9*	*7.2*	*-0.4*	-	-	*-0.2*	*0.3*
Cross-border M&As	99	703	707	250	339	49.1	64.0	0.6	-64.7	35.7
Sales of foreign affiliates	5 105	21 293	33 300	30 213[b]	32 960[b]	8.2	7.1	14.9	-9.3	9.1
Value-added (product) of foreign affiliates	1 019	3 570	6 216	6 129[b]	6 636[b]	3.6	7.9	10.9	-1.4	8.3
Total assets of foreign affiliates	4 602	43 324	64 423	53 601[b]	56 998[b]	13.1	19.6	15.5	-16.8	6.3
Exports of foreign affiliates	1 498	5 003	6 599	5 262[c]	6 239[c]	8.6	3.6	14.7	-20.3	18.6
Employment by foreign affiliates (thousands)	21 470	55 001	64 484	66 688[b]	68 218[b]	2.9	11.8	4.1	3.4	2.3
GDP	22 206	50 338	61 147	57 920[d]	62 909[d]	6.0	1.4	9.9	-5.3	8.6
Gross fixed capital formation	5 109	11 208	13 999	12 735	13 940	5.1	1.3	10.7	-9.0	9.5
Royalties and licence fee receipts	29	155	191	187	191	14.6	10.0	13.6	-1.9	1.7
Exports of goods and non-factor services	4 382	15 008	19 794	15 783[d]	18 713[d]	8.1	3.7	14.7	-20.3	18.6

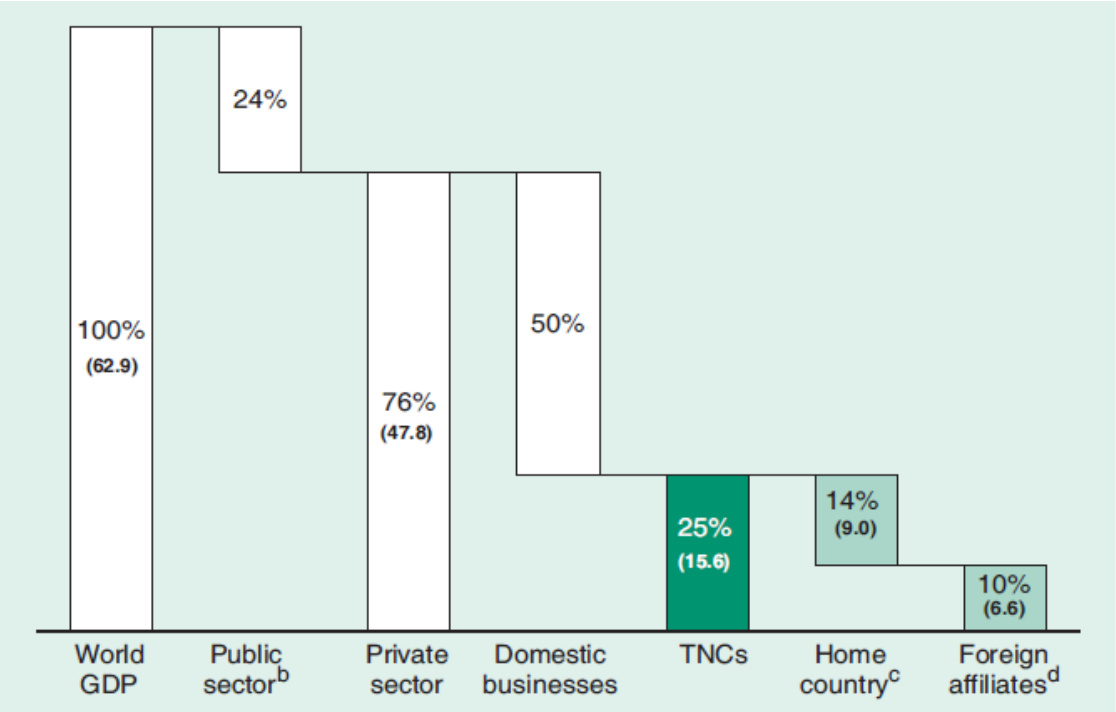
Source: UNCTAD, World Investment Report 2011, Table I.5, page 24.

Table 3.A.4
Internationalization statistics of the 100 largest non-financial TNCs worldwide and from developing and transition economies (Billions of dollars, thousands of employees and per cent).

	100 largest TNCs worldwide					100 largest TNCs from developing and transition economies		
Variable	2008	2009	2008–2009 % change	2010[b]	2009–2010 % change	2008	2009	% change
Assets								
Foreign	6 161	7 147	16.0	7 512	5.1	899	997	10.9
Total	10 790	11 543	7.0	12 075	4.6	2 673	3 152	17.9
Foreign as % of total	57	62	4.8 [a]	62	0.3 [a]	34	32	-2.0 [a]
Sales								
Foreign	5 168	4 602	-10.9	5 005	8.8	989	911	-7.9
Total	8 406	6 979	-17.0	7 847	12.4	2 234	1 914	-14.3
Foreign as % of total	61	66	4.5 [a]	64	-2.2 [a]	44	48	3.3 [a]
Employment								
Foreign	9 008	8 568	-4.9	8 726	1.8	2 651	3 399	28.2
Total	15 729	15 144	-3.7	15 489	2.3	6 778	8 259	21.9
Foreign as % of total	57	57	-0.7 [a]	56	-0.2 [a]	39	41	2.0

Source: UNCTAD, World Investment Report 2011, Table I.6, page 27.

Figure 3.A.1
TNCs account for one-quarter of world GDP, 2010 (Per cent and trillions of dollars)



Source: UNCTAD, World Investment Report 2011, Figure I.22, page 25.